

# '68'

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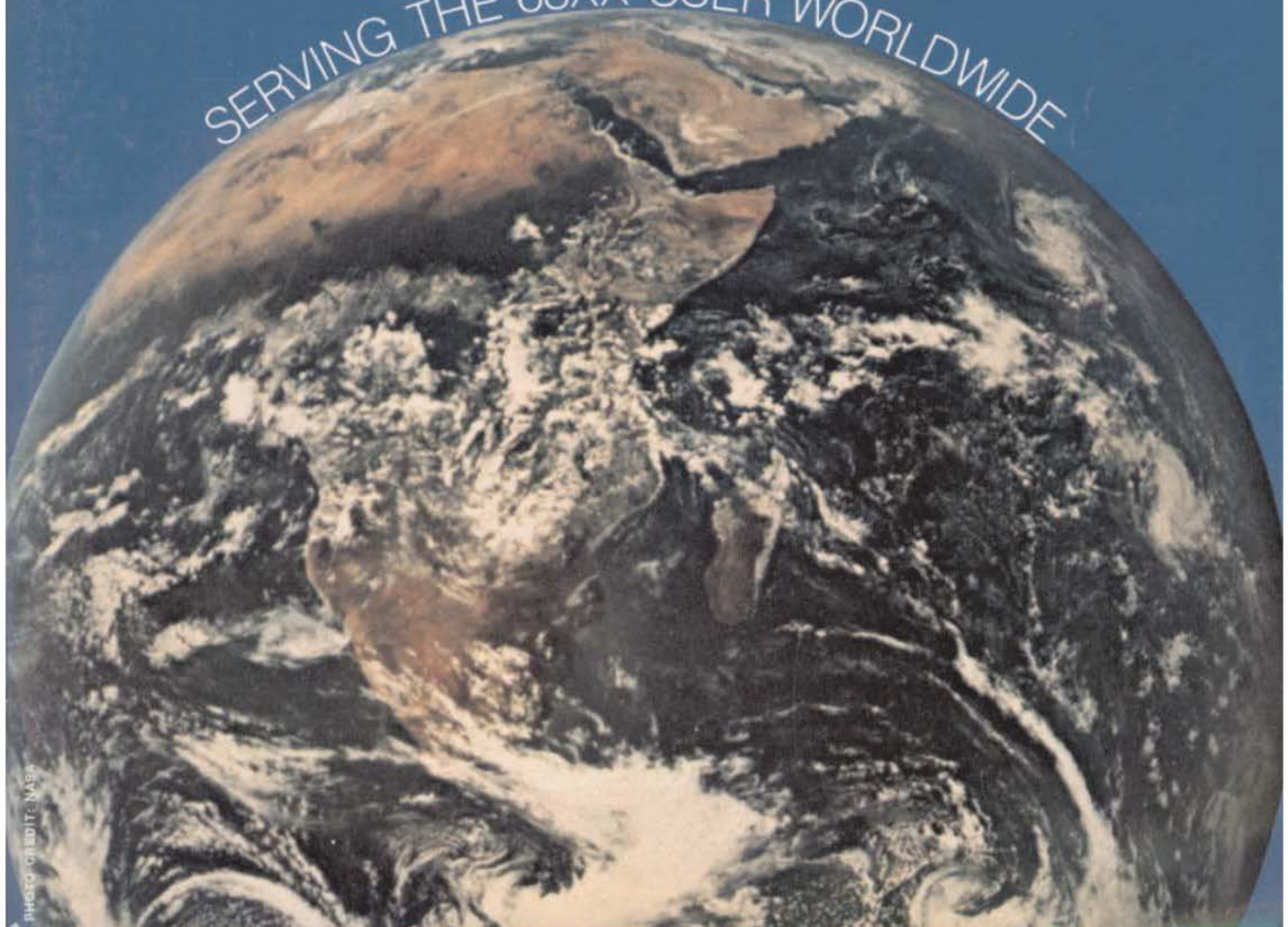
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## MICRO JOURNAL

**VOLUME IV ISSUE V • Devoted to the 68XX User • May 1982**  
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# Pascal for 6809

Pascal for the 6809 is a true native code compiler. Unlike the usual P-code Pascals which run in an interpretive manner, ours produces efficient assembly language mnemonics which can be assembled and run directly. This compiler is available for both 6809 FLEX™ and UniFLEX™. Many features not found in other Pascal systems were implemented while avoiding those features completely non-standard. Features of the Pascal system include:

- Supports most of Jensen and Wirth specification
- Produces fast and efficient 6809, native code
- FLEX run-time package may be trimmed
- Double precision real numbers (16.8 digits)
- Implements scalar, subrange and structured data types
- Standard I/O using file buffer pointers
- Dynamic storage allocation
- Ability to call other Pascal programs
- FLEX version may call assembly language programs
- Buffered or single character terminal input
- Standard math functions: SIN, COS, ARCTAN, EXP, LN, SQR, SQRT
- Random number generator function
- Many usable, sample programs included
- UniFLEX version supports:
  - Random file positioning
  - Ability to call various UniFLEX system routines
  - Ability to execute UniFLEX utility commands

Pascal on diskette for 5" and 8" 6809 FLEX is available for \$200.00. The 5" version requires two disk drives. The UniFLEX version is \$300.00 and includes one year of maintenance. All orders should include 3 percent for postage and handling (10 percent on foreign orders).

™FLEX and UniFLEX are trademarks of Technical Systems Consultants, Inc.

 **technical systems  
consultants, inc.**  
111 Providence Rd., Chapel Hill, N.C. 27514  
(919) 493-1451

# '68'

# MICRO JOURNAL

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FLEX is TM of TSC

GIMIX Super Mainframe-Assorted memory boards  
GIMIX Inc.  
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#### Items Submitted for Publication

Articles submitted for publication should be accompanied by the authors full name, address, date and telephone number. It is preferred that articles be submitted on either 5 or 8 inch diskette in TSC Editor format or STYLO format. All diskettes will be returned.

The following TSC Text Processor commands ONLY should be used (due to our proportional processor): .sp space, .pp paragraph, .fi fill and .nf no fill. Also please do not format within the text with multiple spaces. The rest we will enter at time of editing.

STYLO commands are all acceptable except the .pg page command, we print edited text files in continuous text.

All articles submitted on diskettes should be in TSC FLEX format, either FLEX2 6800, or FLEX9 6809 any version.

If articles are submitted on paper they should be on white 8X11 bond or better grade paper. No hand written articles (hand written or drawn art accepted). All paper submitted articles will be photo reproduced. This requires that they be typed or produced with a dark ribbon (no blue), single spaced and type font no smaller than 'elite' or 12 pitch. Typed text should be approximately 7 inches wide (will be reduced to column width of 3 1/2 inches). Please use a dark ribbon!

All letters to the editor should also comply with the above and bear a signature. Letters of 'gripes' as well as 'praise' are solicited. We attempt to publish all letters to the editor verbatim, however, we reserve the right to reject any submission for lack of 'good taste'. We reserve the right to define what constitutes 'good taste'.

Advertising: Commercial advertisers please contact the 68 Micro Journal advertising department for current rate sheet and requirements.

Classified: All classified must be non-commercial. Maximum 20 words per classified ad. Those consisting of more than 20 words should be figured at .35 cents per word. 20 words or less \$7.50 minimum, one time, paid in advance. No classified ads accepted by telephone.





## JUDGE THE REST, THEN BUY THE BEST

Only GIMIX offers you **SOFTWARE SWITCHING** between MICROWARE's OS-9 and TSC's FLEX. Plus you get the power of the GMXBUG system monitor with its advanced debugging utility, and memory manipulation routines. A wide variety of languages and other software is available for these two predominant 6809 Disk Operating Systems.

*You can order a system to meet your needs, or select from the 6809 Systems featured below.*

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GIMIX' CLASSY CHASSIS™ is a heavyweight aluminum mainframe cabinet with back panel cutouts to conveniently connect your terminals, printers, drives, monitors, etc. A 3 position keyswitch lets you lock out the reset switch. The power supply features a ferro-resonant constant voltage transformer that supplies 8V at 30 amps, + 15V at 5 amps, and - 15V at 5 amps to insure against problems caused by adverse power input conditions. It supplies power for all the boards in a fully loaded system plus two 5 1/4" drives (yes! even a Winchester) that can be installed in the cabinet. The Mother board has fifteen 50 pin and eight 30 pin slots to give you the most room for expansion of any SS50 system available. 11 standard baud rates from 75 to 38.4K are provided and the I/O section has its own extended addressing to permit the maximum memory address space to be used. The 2 Mhz 6809 CPU card has both a time of day clock with battery back-up and a 6840 programmable timer. It also contains 1K RAM, 4 PROM/ROM/RAM sockets, and provides for an optional 9511A or 9512 Arithmetic Processor. The RAM boards use high speed, low power STATIC memory that is fully compatible with any DMA technique. STATIC RAM requires no refresh timing, no wait states or clock stretching, and allows fast, reliable operation. The system includes a 2 port RS232 serial interface and cables. All GIMIX boards use gold plated bus connectors and are fully socketed. GIMIX designs, manufactures, and tests in-house its complete line of products. All boards are twice tested, and burned in electrically to insure reliability and freedom from infant mortality of component parts. All systems are assembled and then retested as a system after being configured to your specific order.

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Chart shows total capacity in Bytes for 2 drives.

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NOTE: UNIFLEX can not be used with 5" minifloppy drives.

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# Build performance into your system using the OS-9™ toolbox!

Microware's OS-9 Toolbox holds the finest 6809 programming languages and software tools in the industry. Microware languages are complete language implementations that meet or exceed applicable industry standards, and have unmatched speed, efficiency, and ease of use that Microware software is famous for. *All Microware languages run on OS-9 Levels One or Two.*

## OS-9 PASCAL™ LANGUAGE COMPILER



The OS-9 Pascal language compiler is the most complete and versatile Pascal available for the 6809. OS-9 Pascal has the unusual capability of generating P-code for interpretive execution while debugging OR highly optimized 6809 assembly language source code output for maximum speed. Another feature of OS-9 Pascal is its "virtual memory" P-code interpreter that lets you run incredibly large Pascal programs. OS-9 Pascal meets the ISO 7185.1 Standard and the complete Wirth/Jensen specification.

## CIS COBOL™ COMPILER



6809 CIS Cobol is a compact, interactive and standard Cobol language compiler which is ideal for the most demanding business applications. Standard features are: ISAM, Debug, ACCEPT/DISPLAY, and Interprogram Communications modules. CIS Cobol is the preeminent microcomputer Cobol in the industry, and the OS-9 version retains full compatibility with CP/M applications software. CIS Cobol meets the ANSI 1974 Level One COBOL standard and is CSA certified. Also available is Micro Focus' FORMS 2, an optional automatic program generator that lets you interactively design screen-oriented applications with ease.

## BASIC09™ STRUCTURED BASIC INTERACTIVE COMPILER



Basic09 is the fastest and most comprehensive full Basic language available for the 6809. It combines standard Basic with the best features of Pascal. It is a unique interactive compiler that combines compiler speed, interpreter friendliness, and superlative debugging facilities. RunB, a ROMable run-time system for compiled Basic09 programs is now available as an option.

## C LANGUAGE COMPILER



C—the systems language of the future—is here today on OS-9. This is a complete implementation of the Unix Version 7 C language including INT, CHAR, SIGNED, UNSIGNED, FLOAT and LONG data types, structures, unions, standard C library, and a full preprocessor with macro definitions. Generates fully reentrant 6809 assembly language source code output.

For information contact your computer supplier, or

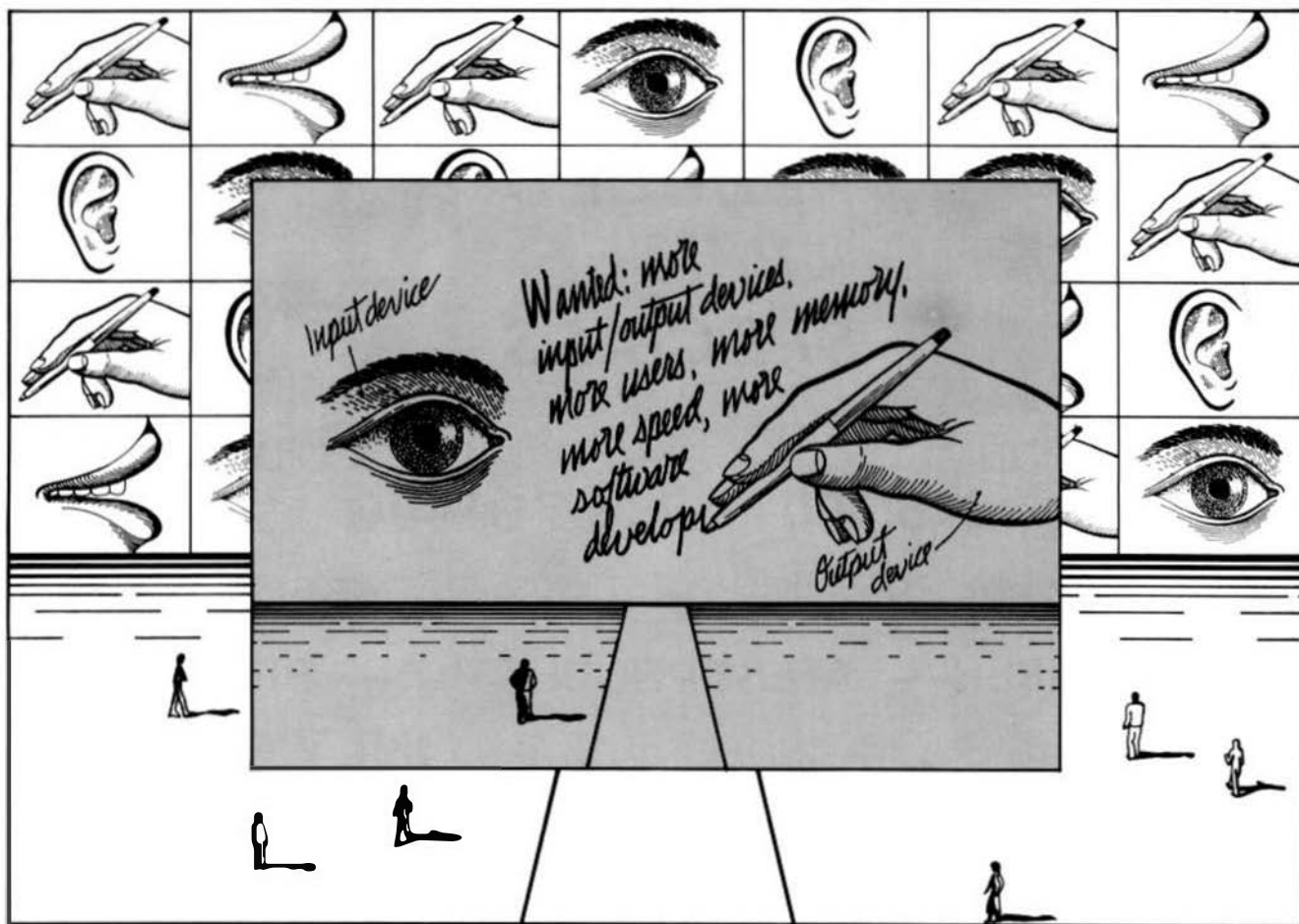


## MICROWARE

Microware Systems Corporation  
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## Expand your horizons with OS-9™ Level Two

**E**xpand your 6809 computer to a fast, efficient multi-user system utilizing up to one megabyte of memory, almost any I/O device, and comprehensive implementations of the most-wanted programming languages: Basic, C, Pascal, Cobol, and Assembler.

With OS-9 Level Two, your computer is transformed into the ultimate software development system with performance and features found only on large and costly computing systems. It brings to your fingertips the friendliness and power of a Unix\*-based environment. You can even run most Unix\* software tools using OS-9's Unix Version 7 compatible C Compiler.

**As a multiuser system,** OS-9 Level Two excels with a multi-level directory system, a fast random access file system with record lockout, user name/password log-on protection, "pipes" for interprogram communication, and full file security. The versatile "Shell" command interpreter makes it easy for each user to run interactive or multiple background programs with I/O redirection to or from any file or I/O device.

**As a real-time system,** your OS-9-based computer can sense, monitor, control, and communicate with the real world thanks to OS-9's highly modular and user expandable structure. Adding customized I/O to OS-9 is

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**For large systems,** OS-9 Level Two can handle over one megabyte of RAM and ROM memory with extraordinary efficiency. When, as is often the case, two or more tasks run the same program (such as Basic®) they automatically "share" just one copy in memory. Also, OS-9 Level Two typically resides in less than 24K memory. Savings like these give OS-9 based systems large capacity without having to resort to performance-robbing techniques such as disk swapping.

OS-9 Level Two is available exclusively from manufacturers of most popular 6809 computers equipped with memory management hardware. They offer versions specifically tailored to their computers for use with both new and existing systems.

For more information about OS-9 Level Two contact your computer supplier, or



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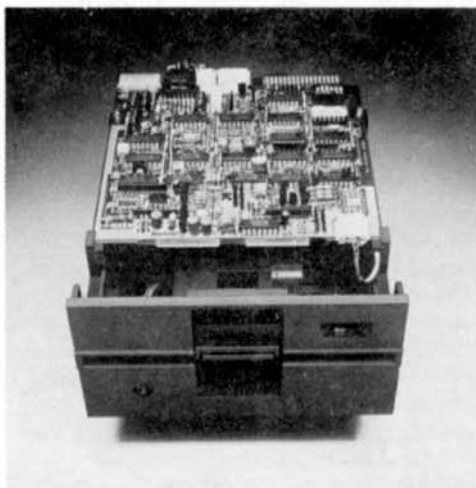
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1 MHZ - No extended addressing

Can be set up for \$0-7FFF or 8000-FFFF

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■ **NOTE** - When ordering cables please specify \$50 Bus or Other!!!

**Call or write for disk controller Board information.**

**SHIPPING:** - Memory Boards or Cables, Add \$4.50; Printers, Add \$7.50  
- Disk Drives or Cabinets with Power Supply, Add \$7.50



# EXCITING NEWS FOR COLOR COMPUTER USERS

## FLEX, OS-9 and the Radio Shack Disk System ALL on the SAME Color Computer

Would you believe that you can run FLEX, OS-9 and Radio Shack disk software on the same Color Computer, and all you have to do is change the disk? That's right, just change the disk. If you have a 32K Color Computer with the Radio Shack disk system, all you need to do is make a trivial modification to access the hidden 32K, as described in the Feb. issue of COLOR COMPUTER NEWS and the April issue of '68' Micro. You can get FLEX from us right now. OS-9 will be ready by summer. Please note that this will only work with the Radio Shack disk system and 32K/64K memory chips that RS calls 32K. Maybe they put 64K's in yours, too. If you don't have a copy of the article, send a legal size SASE (40¢ stamps) and we'll send it to you.

Using this system to run FLEX and OS-9 has many advantages. First, it gives you 48K from zero right up to FLEX. This means that **ALL FLEX compatible software will run with NO MODIFICATIONS and NO PATCHES!** There are no memory conflicts because we moved the screen up above FLEX which leaves the lower 48K free for user programs.

What you end up with is 48K for user programs, 8K for FLEX and another 8K above FLEX for the screens and stuff. We have a multi screen format so you can page backward to see what scrolled by and a Hi-Res screen that will enable us to have 24 lines by 42 character display is on the way. That's better than an Apple!

We also implemented a full function keyboard, with a control key and escape key. All ASCII codes can now be generated from the Color Computer keyboard!

We also added some bells and whistles to Radio Shack's Disk system when you're running FLEX or OS-9. We are supporting single or double sided, single or double density, 35, 40 and 80 track drives. If you use double sided drives, the maximum is three drives because we use the drive 3 select for side select. When you are running the Radio Shack disk, it will work with the double sided drives but it will only use one side and only 35 tracks. Using 80 track drives is okay, but will not be compatible with standard Radio Shack software. You can also set each drive's stepping rate and drive type. (SS or DS - SD or DD)

In case you don't understand how this works, I'll give you a brief explanation. The Color Computer was designed so that the roms in the system could be turned off under software control. In a normal Color Computer this would only make it go away. However, if you put a program in memory to do something first (like boot in FLEX or OS-9), when you turn off the roms, you will have a full 64K RAM System with which to run your program (FLEX or OS-9). When the roms are turned off, it is as if you had removed them from the computer. They are gone!

Now, we need the other half of the 64K ram chips to work, and this seems to be the case most of the time, as the article states. Of course, you could also put 64K chips in.

Some neat utilities are included.

MOVEROM moves Color Basic from ROM to RAM. Because it's moved to RAM you can not only access it from FLEX, you can run it and even change it!! You can load Color Computer cassette software and save it to FLEX disk. Single Drive Copy, Format and Setup commands are also included.

Installing FLEX is simple. Insert the disk and type:

### RUN "FLEX"

That's all there is to it! You are now up and running in the most popular operating system for the 6809. There are hundreds of software packages now running under the FLEX system. Open your Color Computer to a whole new world of software with FLEX.

### FLEX \$99.00

NEW LOW PRICE INCLUDES OVER 25 UTILITIES!

FLEX Editor	\$ 50.00
FLEX Assembler	\$ 50.00
FLEX Standard BASIC	\$ 65.00
FLEX Extended Business BASIC	\$100.00
Other languages available include; FORTH, Pascal, Fortran77, 'C,' plus more.	

Application packages include; A/R, G/L, A/P, Inventory, Electronic Spreadsheets, Accounting, Database programs and more. SEND FOR LIST.

TRS-80 COLOR COMPUTER COMPLETE WITH 64K RAM, 24K ROM, SINGLE DISK DRIVE AND FLEX, SET UP AND READY TO RUN FOR ONLY \$1,375. Includes 60 day extended warranty. If you have a Computer, call about RS disk controllers and drives.

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# DynaStar WORD PROCESSING SYSTEM FOR OS-9

## OS-9 USERS:

If your computer has a SCREEN and you're still struggling with an editor that only knows about LINES, then obviously YOU don't know about

## DynaStar

DynaStar is a powerful, menu-driven screen editor equally suited to the tasks of program preparation and document processing. With the addition of the optional DynaForm print formatter, it is the best word-processing package you can buy for your OS-9 system.

DynaStar Version II is now available and features no-nonsense "what you see is what you get" editing for virtually any terminal with or without cursor addressing (it must be at least able to go to "home"). To edit, simply place the cursor where you want it, and type. Any printable character you type is entered directly into your text, and any non-printable control character causes immediate execution of an editing command. Single keystroke commands permit movement of the cursor in any direction, by character, tab, word, line, or screen full, and deletion of characters, words (left or right) or a whole line. Two keystroke commands augment this set by moving the cursor to the left margin, top or bottom of the screen, beginning or end of the edit buffer, or the beginning of the next paragraph. You can search for any string, replace with any other, do it again, mark original blocks of text, copy, move or delete blocks, read or write to side-files, set tabs and margins, or center the current line.

DynaStar features automatic word-wrap, and it can right-justify text as you enter it so you will see exactly how it will look before you print it. If you later make alterations or change the margins, you can reform the

text a paragraph at a time with two keystrokes. For programmers, there is a special automatic indent mode to help you write well-structured code. DynaStar includes a Shell command which lets you do almost anything (including edit another file) without even losing your place in your current document, and it permits editing of large disk files in stages without forcing you to break up your files.

If you want to define more powerful commands, DynaStar includes a macro facility which lets you convert any control character to one or a string of characters of your choice. You can use this feature to create global search-and-replace commands, insert "boiler-plate," or simply re-map your keyboard. You can also provide a special "start-up string" which is automatically executed whenever you enter the editor to set up modes such as auto-justification, display a directory, define your favorite macros, or re-map the keyboard.

For complete word-processing, we offer our DynaForm text formatter which provides all the standard features such as pagination, headers and footers with page numbers, single space, double space, multiple space, bold face, double-strike, and underlining. DynaForm has its own macro facility with string variables, nested include files, a full merge-print capability for generating form letters and mailing lists, and it can generate an index automatically, sorted alphabetically or by page number. You can call it from DynaStar to proof-print the active edit buffer, or by itself to print a disk file while you edit another.

DynaStar costs only a little more than that line-oriented editor and it is available today. If you're still not convinced that it would be the best thing that ever happened to your video terminal, you can order our "Doubting Thomas" test pak consisting of complete documentation and a special version of DynaStar that lets you edit to your heart's content, but won't update your files. Later when your doubts melt away, you can obtain credit on the full purchase price and join the faithful who bought the whole thing in the first place.

"Doubting Thomas" test pak: \$ 49.95  
DynaStar II for the faithful: \$149.95  
DynaForm text formatter: \$149.95  
Both purchased together: \$299.90  
Note: DynaStar Version II (no macros) will be available at the original price until May 31, and current owners may upgrade to Version II with full credit until June 30.

AVAILABLE SOON FOR FLEX 8

## Spelltest

From Dale Puckett

FOR OS-9 AND FLEX

SPELLTEST is the most versatile 68Kx spelling checker available.

MENU MAKE OPERATION EASY: From the menu you may: Print a list of suspect words; Print a list of valid words; Check each suspect word one by one; Read your test; stopp to check suspect words; Use additional dictionaries for more thorough checking or special applications; Build an additional dictionary of newly accepted words; Write correct text line to disk; While checking you may: Accept the suspect word; Accept and save in the dictionary; Replace with correct spelling.

Designed to be used by the layman, SPELLTEST is right at home in the office. Ease of use and speed will recover the cost in days.

22,000 word dictionary covers the first 25,000 entries in the American Heritage listing of the most common English words.

500 built-in common words (and, or, the, etc) and 380 specific to your field, filter the text and allows a large file to be processed even in small computers.

PRICE \$199.00

## CRASMB

MULTI CPU CROSS ASSEMBLER FOR 6809

FLEX

by Frank Hoffman

CRASMB is a conditional macro assembler with the capability to use different CPU overlays in order to cross assemble. These CPU overlays called CPU PERSONALITY MODULES (CPM's) can be called from a source file, thereby making it easy to create object code for a variety of CPUs. It is also possible to create new CPM's yourself for any 8 or 16 bit CPU. The information needed is included in the manual. If you decide to do this, it would be advisable to purchase the source for one of the CPM's and modify it rather than starting from scratch. CPM's are currently available for the following CPUs: 6809, 6800, 6805, 6502, Z80/B080, 1802, and others coming.

PRICE \$139.95

Includes one 8 bit CPM of your choice (not source)

Additional CPM's

8 bit \$25.00

Source \$25.00 extra

## 6502 TRANSLATOR

Translator 6502 code to 6809

\$75.00

## INVENTORY

with MATERIAL

REQUISITION PLANNING

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# Flex User Notes

BY: RONALD W. ANDERSON  
3540 STRUBRIDGE COURT  
ANN ARBOR, MI 48105

## MORE ON PASCAL

Last time I included a Hex-ASCII memory dump program in Lucidata Pascal, as an example. It had one problem, in that it wouldn't dump the upper half of memory. After sending the disk of to 68 Micro Journal, I spent a couple of evenings trying to beat the system, and finally decided that it is not possible to assign memory to variables beyond 32767 bytes (probably because of the integer limit, and the fact that the compiler is written in Pascal). I tried using a doubly dimensioned array MEMORY : [0..255,0..255] OF BYTE;. I tried dividing memory into quarters and declaring four arrays of BYTE, then reducing the PAGE to 1/4 of memory max, and deciding which array to access with some logic. All failed as soon as memory allocation got past 32767 bytes.

I decided to see what I could do with Omegasoft Pascal. I found a statement in the manual that said "Array size cannot exceed 32767 bytes. The total variable size of a block cannot exceed 32767 bytes." That would explain my problem with Lucidata Pascal and would indicate that Omegasoft wouldn't do the job either. Having used Omegasoft previously, I knew that an array index could be larger than the limit of the array without causing an error, if the compiler range checking option is not enabled. I decided to try declaring an array of index 0..16383 and simply disregarding the limit.

Omegasoft has a variable type HEX, so I thought I could use that to some advantage, and in fact, input of the PAGE in HEX worked fine. I also found that I could output the address at the start of each line as the sum of the page, line, and position, all HEX variables. That worked fine, but surprise, when I tried to output the contents of each memory location as a HEX value, using WRITE (VALUE:2), I found that the format specification is ignored and all HEX numbers are output as four digits. Of course the first two were always 00. I had to go write the function CVT that is identical to the function HEX I used in the Lucidata program. I couldn't call it HEX since that is the name of the data type HEX.

Next problem was that, although there was no runtime error in using an array index past the end of the array, the contents of all memory locations above the end of the declared array always came back as \$10. I had to resort to an external function GETBYTE, which I passed the address of the desired byte, and simply loads the A accumulator with the contents of that location and pushes it on the U stack as a return parameter from the function. Since the type HEX can assume any value from 0 to \$FFFF, the address is valid anywhere in memory directly.

Now, I was annoyed at having to hit return after a 'B' or 'F' command. The Omegasoft system buffers all input from the terminal, so a return is required before the input character is read. I used another external function to jump to the FLEX GETCHR routine and put the contents of A on the user stack as the return parameter. The external routines are listed here along with the program. You will note that the availability of HEX data types simplifies the program considerably. The fact that outputting a HEX value doesn't honor the format parameter complicates things a bit, but the program is still simpler than the original Lucidata version.

After getting the Omegasoft version running, I

thought I would go back and do the modification to the Lucidata version, using an external FUNCTION to get a byte from memory. I had to get around the inability to use INTEGER numbers larger than 32767 or \$7FFF by adjusting the PAGE input. If PAGE is larger than \$7F, I subtract 128 (\$80) from it and set a boolean flag UPPER to true. If PAGE is less than half memory, I leave it alone and set UPPER to false. I pass the memory pointer and the boolean UPPER to the external routine and adjust the pointer there if necessary. I very carefully followed the directions in the Lucidata manual and met with total failure. I used the pointer MARKUS to find the location of the parameters passed to the Assembler code, and returned the BYTE from memory at MARKUS - 1 as indicated. After a couple of long evenings of frustration, I discovered that the first instruction in the Assembler code simply wasn't being executed. I found that two NOP instructions there, fixed the problem. As you can see by the listing GETBYTE, I pulled the parameters from the Pascal stack, performed the operations required, and stuck the result at MARKUS - 1.

The Lucidata manual indicates that the parameters for an EXTERNAL procedure are placed on the stack, but that they are also passed in the main registers. The first two bytes of parameter, for example, are to be found in X, and the next two in A and B respectively. That means that I shouldn't have to load X and A from the stack as I did, since the proper values should be in them already. I tried eliminating the loads from the Pascal stack with no luck. A few test externals later, I deduced that TRUE was being represented as \$FF and false was anything else. This is puzzling because I had assumed \$FF for TRUE and 0 for FALSE in the original external routine in which I pulled the boolean off the stack, and that worked fine.

I dumped the numbers passed to the external in A for various pages, and got \$06 for the FALSE condition once and \$84 or some other negative number for FALSE another time. I modified the external to test the flag for being \$FF by incrementing it and testing for non-zero for FALSE. That seemed to work fine and is included here as GETBYTE1 listing. I suspect that a FALSE simply is not making it to the A register to be passed to an external, but a TRUE is. There is probably a chance in 256 that I will get an erroneous TRUE using this scheme.

Being quite puzzled over the peculiarities in the above, I sent a letter off to Lucidata. After a couple of exchanges of information, Nigel Bennet of Lucidata had the explanation. It seems that Pascal checks to find out how much memory is available by writing \$AA to the first byte of every page of memory. It then reads that byte to see if RAM is there. Pascal stops checking when it reaches the address stored in FLEX MEMEND, or an address stored in the Pascal runtime location LIMIT. The user may overlay LIMIT or MEMEND with an address lower than the actual limit of memory. In the case of my External, I should have changed MEMEND to \$6FFF. Another option would be to put the External in the FLEX Utility area above \$C100.

This also explains how the FALSE boolean value in the A accumulator got clobbered when I tried to use the parameters passed in the registers. \$AA is the instruction ORA -14,X. Of course that instruction was executed, altering the contents of the A accumulator most of the time. ORing \$FF with anything, doesn't change it, so TRUE never changed, but FALSE was almost always changed to something else. As I said to Nigel, why is it that the seemingly most difficult bugs have the simplest solutions. Since this information was received in time for publication, I have changed the GETBYTE utility to its simplest form and I am including it as GETBYTE2. If you use GETBYTE2, remember to change the constant ASEM in DUMPL from \$7000 to \$C400.

At any rate, the two programs DUMPO for OmegaSoft, and DUMPL for Lucidata both work throughout memory. The OmegaSoft version is automatically a binary file when the compiler is done. The Lucidata version may be made a binary command file by using the RUNCMD utility supplied by Lucidata as an overlay to their RUN. RUNCMD doesn't run the program but loads it to memory, and reports the limits of memory to SAVE to make a binary file. It also reports the transfer address. After saving the file, you simply append the binary file for the GETBYTE code. Rename the file with a .CMD extension, and copy to your system drive, and DUMPL will work about like any utility in FLEX. Of course, DUMPL and DUMPO are both too big to fit in the Utility space at \$C100, so they will wipe out memory where they load. As a matter of interest, DUMPO loads from 0 to \$0AD1 with the Pascal stack located wherever the user desires. DUMPL loads from 0 to \$120F, with the stack just above that address. GETBYTE could be ORGed just above the stack at \$1300 or so, since there are few variables used in the program. To squeeze as much as possible, you would have to move GETBYTE to successively lower addresses the program crashes, and then move it back up again. It could also be located above the Lucidata used area of the Utility space, above \$C400.

The moral of the story is that extensions seem not to be too well documented, and they may not follow what you might consider to be the "normal" rules. The fact that OmegaSoft has no BYTE variable necessitates using CHAR to return a single byte from the GETBYTE function. We could use INTEGER and stuff a 00 byte on the user stack with the external routine, which would simplify the output of the hex value and complicate the output of the ASCII value, so it really doesn't matter a great deal.

Perhaps the conclusion of this exercise should be stated. It should be fairly obvious that Pascal is not a good language to use to implement a Utility program that has to get into the computer SYSTEM including memory accesses, etc. Extensions are absolutely necessary (absolute memory assignment for variables OR linkage to external assembler code). The problem seems to be that different compilers have different extensions, but neither of those used here seem to have enough to make the programming straightforward. I spent the vast majority of my time trying to program around the limitations of Pascal. This is not a slur on either one of the compilers used, but more a comment on Pascal itself. The very rigid type and range checking are almost impossible to defeat even though doing so would result in a vastly simpler program.

I should add that there are very many applications in which Pascal is eminently suitable. System Utility programs just don't happen to be among those applications. I have a strong suspicion that "C" would be a good language to implement this DUMP utility. I am passing an early copy of this along to Norm Commo to see what he can do in "C" to duplicate the function of the two programs in Pascal and/or the one in Assembler.

Since I wrote this a couple weeks ago, I've heard from Norm, and he has sent me a dump program in C. While I was waiting, I wrote one myself, just to try my hand at C. Next month, I will publish his and mine, with some comments about the enhancements he has added, in the way of using some more advance features of C that I don't fully appreciate yet as a beginner.

```

3      * EXTERNAL FUNCTION FOR LUCIDATA DUMP PROGRAM
4      *
5      * ENTERED WITH ADDRESS IN I REGISTER
6      * AS VALID INTEGER VALUE
7      * A CONTAINS BOOLEAN FLAG THAT INDICATES
8      * UPPER HALF OF MEMORY, MEANING TO ADD $8000 TO
9      * THE ADDRESS IN I
10

```

```

11      * BYTE TO BE RETURNED AS INTEGER IN STACK
12      * RETURN AREA POINTED AT BY MARKUS
13      *
14      0144 MARKUS EQU $144
15      7000 ORG $7000
16      7000 12 STARTO NOP
17      7001 12 NOP
18      7002 BE 0144 LDI MARKUS
19      7005 A6 08 LBA 8,I
20      7007 AE 06 LDI 6,I
21      7009 40 START TSTA
22      700A 27 07 BEI GETI
23      700C 1F 10 TFR I,D
24      700E C3 8000 ADDI $8000
25      7011 1F 01 TFR 0,I
26      7013 A6 84 GETI LDA 0,I
27      7015 BE 0144 LDI MARKUS
28      7018 A7 1F STA -1,I
29      701A 39 RTS

```

0 ERROR(S) DETECTED

SYMBOL TABLE:

```

GETI 7013 MARKUS 0144 START 7009 STARTO 7000
3      * EXTERNAL FUNCTION FOR LUCIDATA DUMP PROGRAM
4      *
5      * ENTERED WITH ADDRESS IN I REGISTER
6      * AS VALID INTEGER VALUE
7      * A CONTAINS BOOLEAN FLAG THAT INDICATES
8      * UPPER HALF OF MEMORY, MEANING TO ADD $8000 TO
9      * THE ADDRESS IN I
10
11      * EXPERIMENT HAS INDICATED THAT OFF INDICATES TRUE
12      * AND ANY OTHER VALUE IS INTERPRETED AS FALSE FOR
13      * A BOOLEAN VARIABLE IN LUCIDATA PASCAL.
14      *
15      * BYTE TO BE RETURNED AS INTEGER IN STACK
16      * RETURN AREA POINTED AT BY MARKUS
17      *
18      0144 MARKUS EQU $144
19      7000 ORG $7000
20      7000 12 STARTO NOP
21      7001 12 NOP
22      7002 4C START IMCA OVERFLOW FROM OFF TO 0 IF TRUE
23      7003 26 07 BNE GETI
24      7005 1F 10 TFR I,0
25      7007 C3 8000 ADDI $8000
26      700A 1F 01 TFR 0,I
27      700C A6 84 GETI LDA 0,I
28      700E BE 0144 LDI MARKUS
29      7011 A7 1F STA -1,I
30      7013 39 RTS

```

0 ERROR(S) DETECTED

SYMBOL TABLE:

```

GETI 700C MARKUS 0144 START 7002 STARTO 7000
3      * EXTERNAL FUNCTION FOR LUCIDATA DUMP PROGRAM
4      *
5      * ENTERED WITH ADDRESS IN I REGISTER
6      * AS VALID INTEGER VALUE
7      * A CONTAINS BOOLEAN FLAG THAT INDICATES
8      * UPPER HALF OF MEMORY, MEANING TO ADD $8000 TO
9      * THE ADDRESS IN I
10
11      * BYTE TO BE RETURNED AS INTEGER IN STACK
12      * RETURN AREA POINTED AT BY MARKUS
13      *
14      0144 MARKUS EQU $144
15      C400 ORG $C400
16      C400 40 START TSTA FLAG FOR HIGH HALF OF MEMORY
17      C401 27 07 BEI GETI
18      C403 1F 10 TFR I,D
19      C405 C3 8000 ADDI $8000
20      C408 1F 01 TFR 0,I
21      C40A A6 84 GETI LDA 0,I
22      C40C BE 0144 LDI MARKUS
23      C40F A7 1F STA -1,I
24      C411 39 RTS

```



```

0 ERROR(S) DETECTED
SYMBOL TABLE:
GETI  C40A  MARKUS 0144  START  C400
PROGRAM DUMP ( INPUT, OUTPUT );

( HEX ASCII DUMP OF MEMORY )
VAR
  K,L,M,
  LINE, PAGE : HEX;

  N,INDEX : INTEGER;

  CH : CHAR;

FUNCTION GETBYTE (ADDRESS : HEX) : CHAR;
EXTERNAL;
FUNCTION GETCH : CHAR;
EXTERNAL;
FUNCTION CVT (N : INTEGER) : CHAR;
( CONVERTS INTEGER IN 0..15 TO ONE HEX DIGIT ASCII REPRESENTATION )
BEGIN
  IF N IN [0..9] THEN CVT := CHR (N + ORD ('0'));
  IF N IN [10..15] THEN CVT := CHR (N + ORD ('A') - 10);
END;
BEGIN
  WRITE (' PAGE (TWO HEX DIGITS)? ');
  READ (PAGE);
  REPEAT
    WRITELN;
    N := PAGE * 1600;
    FOR LINE := 90 TO 90F DO
      BEGIN
        K := 910 + LINE;
        WRITE (N+K, ' ');
        FOR L := 90 TO 90F DO
          BEGIN
            INDEX := N+K+L;
            M := ORD (GETBYTE (INDEX));
            WRITE (CVT(M DIV 16), CVT (M MOD 16), ' ');
          END;
        WRITE (' ');
        FOR L := 90 TO 90F DO
          BEGIN
            INDEX := N+K+L;
            CH := CHR (ORD(GETBYTE (INDEX)) AND 127);
            IF CH < ' '
              THEN WRITE ('.')
              ELSE WRITE (CH);
          END;
        WRITELN;
      END;
    WRITE ('COMMAND? ');
    CH := GETCH;

    CASE CH OF
      'E' : BEGIN ( DON'T DO ANYTHING ) END;
      'F' : PAGE := PAGE + 1;
      'B' : PAGE := PAGE - 1;
      'M' : READ (PAGE);
    END ( CASE CH )
  UNTIL CH = 'E'
END.

PROGRAM DUMP ( INPUT, OUTPUT );

( HEX ASCII DUMP OF MEMORY )

CONST
  ASER = 87000;

VAR
  K,L,M,N,
  LINE, PAGE : INTEGER;
  UPPER : BOOLEAN; (FLAG FOR UPPER HALF OF MEMORY)
  CH : CHAR;

```

```

FUNCTION GETPAGE : INTEGER;
( CONVERTS TWO ASCII HEX DIGITS TO THE EQUIVALENT INTEGER VALUE.
  COULD BE EXTENDED TO FOUR DIGITS BY CHANGING ARRAY DIMENSION
  AND LOOP COUNT )
VAR
  CH : ARRAY [1..2] OF CHAR;
  K,M : INTEGER;
BEGIN
  WRITE (' STARTING PAGE (TWO HEX DIGITS)? ');
  M := 0;
  FOR K := 1 TO 2 DO
    BEGIN
      M := M * 16;
      READ (CH (K));
      IF CH (K) IN ['0'..'9'] THEN M := M + ORD (CH (K)) - ORD ('0');
      IF CH (K) IN ['A'..'F'] THEN M := M + ORD (CH (K)) + 10 - ORD ('A');
    END;
  GETPAGE := M;
END;
FUNCTION HEX (NUMBER : INTEGER) : CHAR;
( CONVERTS 4 BITS BINARY TO ONE HEX DIGIT ASCII REPRESENTATION )
BEGIN
  IF NUMBER IN [0..9] THEN HEX := CHR (NUMBER + ORD ('0'));
  IF NUMBER IN [10..15] THEN HEX := CHR (NUMBER - 10 + ORD ('A'));
END;

FUNCTION GETBYTE (ADDRESS : INTEGER; UPPER : BOOLEAN; BYTE;
EXTERNAL ASER;
( START OF MAIN PROGRAM )
BEGIN
  PAGE := GETPAGE;
  REPEAT
    WRITELN;
    IF PAGE > 127
      THEN BEGIN
        N := PAGE - 128;
        UPPER := TRUE;
      END
    ELSE BEGIN
        N := PAGE;
        UPPER := FALSE;
      END;
    N := N * 256;
    FOR LINE := 0 TO 15 DO
      BEGIN
        K := 16 + LINE;
        WRITE (HEX(PAGE DIV 16);1,HEX(PAGE MOD 16);1,HEX(LINE);1,' ');
        FOR L := 0 TO 15 DO
          BEGIN
            M := N+K+L;
            M := GETBYTE (M,UPPER);
            WRITE ( HEX (M DIV 16);1, HEX (M MOD 16);1,' ');
          END;
        WRITE (' ');
        FOR L := 0 TO 15 DO
          BEGIN
            M := N+K+L;
            M := GETBYTE (M,UPPER);
            IF M > 127 THEN M := M - 128;
            IF M > 31 THEN WRITE (CHR(M))
              ELSE WRITE ('. ');
          END;
        WRITELN;
      END;
    WRITE ('COMMAND? ');
    READ (CH);
    CASE CH OF
      'E' : BEGIN ( DON'T DO ANYTHING ) END;
      'F' : PAGE := PAGE + 1;
      'B' : PAGE := PAGE - 1;
      'M' : PAGE := GETPAGE;
    END ( CASE CH )
  UNTIL CH = 'E'
END.

```

# COLOR User Notes

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## INTRODUCTION

This month we'll look at Nelson Software Systems **SUPER "COLOR" WRITER** which finally arrived, and still more on **FLEX9** on the Color Computer, including **FLEX** with the Radio Shack Disk Controller. First, though, I want to discuss a few general items pertaining to the Color Computer and this Magazine.

I received a letter from Richard Petty in Salt Lake City, Ut., stating what may be the sentiments of a few of the readers of this Column. Effectively, he says that the **'68' Micro Journal**, and this Column, are 'way over his head' in technical content, and that it is not of much use to him. (I will ALSO add that I have received many letters "patting us on the back" for an excellent Publication which contained some **USEFUL** information.) There are a couple of good, strictly Color Computer, magazines that contain a lot of **BASIC** information and programs for this machine. **'68' Micro Journal** is not in **COMPETITION** with them; the aim of this Magazine is to **EXPAND** that information for the new Users. The **BASIC** Operating System in the Color Computer is a good "version" of the Language, especially for beginners, **BUT**, it will only allow you to use about **10% OF THE CAPABILITY** of the computer. If you really want to learn how to use and build the Color Computer into a Powerful Machine, then I would recommend that you "hang in there" and pick up what you can from the **'68' Micro Journal** articles, ask questions (try the **"HELP"** Column), study, etc., and you will find that it is not that hard, and will soon be a lot of fun.

**'68' Micro Journal** was founded as a Magazine **FOR 68xx** Users **BY 68xx** Users; the Color Computer was fitted in because it uses the Motorola 6809 Microprocessor Chip, and because the normal progression for most Color Computer Users would be from the Color Computer into **SWTPC**, **GIMIX**, **SS8**, **HELIX**, etc. (In fact, we get numerous calls and letters from people who have **BOTH**, and want them to "talk to each other" - thus the push to get **FLEX9** running on this computer. More and more **SS-50** System Users are buying a Color Computer to use at home, and want the ability to work on Programs at home on the Color Computer and then run the Disks on the **SS-50** System at work.) Also, since over **90%** of the **SS-50** Buss Computers use the **FLEX** or **OS-9** Operating Systems, the natural progression would be to learn the Operating System on the much less expensive Color Computer, and then move on up to the "big machines". You might begin with a **4K** Color Computer, expand to **16K** and Extended **BASIC**, and move on up to **64K** and Disk Operations using **FLEX** (and maybe **OS-9** in the near future). Then you might add either a "smart terminal" to allow an **80 x 24** Display, still using the Color Computer for computations; or let the Color Computer become the "smart terminal" and hook it up to a **SS-50** Mainframe Computer. Your Disk Drives will already be compatible with the Mainframe system (you will probably have to get another Disk Controller, especially if you have the Radio Shack System), and any and all Software will be compatible. You can develop a Major Computer System a little at the time, spreading the cost out as you go.

In answer to some of the other questions; **JUST WHAT DO I GET WITH FLEX?** First, **FLEX9** (for the 6809 chip) is the Operating System, or interface between you and the Computer and Disk Systems, just like **BASIC** is on the Color Computer. **FLEX9** is a **DISK** Operating System, just like **CP/M** or **TRSDOS**. It handles all "communication" between **FLEX9** compatible Programs and your specific Computer. For instance, if a Program needs a letter

from the Keyboard, it goes to a specific memory location in **FLEX** asking for it. The conversions we made to the "Input/ output drivers" to make **FLEX** work on the Color Computer determine which key was pressed and "return" that key to the Program. **ANY** Program written for **FLEX9** will look to **THAT MEMORY LOCATION** for a character from the Keyboard; it doesn't care **WHAT** Computer System it is running on, it knows it will get the character at that location. What that means **TO YOU** is that you can run **ANY PROGRAM ADVERTISED IN THIS MAGAZINE** (that is written for **FLEX9**) **ON THE COLOR COMPUTER**, if you have it running the **FLEX9** Operating System.

One thing you gain when you get your system "up and running" on the **FLEX9** Operating System is the capability to run one of the best and fastest **BASIC** Systems available; TSC's **XBASIC**, or Extended **BASIC**. Believe it or not, the big majority of the Business Programs you see advertised in the **'68' Micro Journal** are written in **XBASIC**. Add the TSC **BASIC PRECOMPILER** and you can create programs without line numbers, use multiple character variables, alphanumeric line and subroutine labels, etc., which is output in standard **XBASIC** Compiled form. The Text Processor is one of the most powerful Text Processors available; complete books can be written using its capabilities. TSC's Machine Language Sort-Merge allows **ANY SIZE** file to be Sorted and Merged together, **FAST**, and can be used as a **BASIC "USR"** Function. For the Machine Language types, the **FLEX** File Management System is solid, safe, and extremely easy to use in Programming. For the User, the **FMS** handles **ALL** Disk Accessing, relieving him of the details. All in all, it is an excellent Disk Operating System.

But, I'm not into Machine Language Programming, which is all I see in the **'68' Micro Journal**, you say. No, and neither are a big majority of the rest of the readers, either, **but you don't have to be a "Machine Language Programmer" to learn more about how YOUR Computer WORKS** by reading the information in the articles, columns, etc.

A final note: as I said before, **'68' Micro Journal** is a magazine **FOR** the Users, **BY** the Users. The Letters, Articles, Programs, etc., that you see published are submitted with the idea of **SHARING INFORMATION**. We have received some complaints from Color Computer Readers that we don't have any Color Computer Programs, **BASIC** or otherwise. **WE WON'T HAVE UNTIL YOU SEND THEM IN.** We get letters requesting information on this **BASIC** Function and that **BASIC** Function (e.g. the **USR** Function, for example). If these were neatly typed, we could print some of them in the **"HELP"** Column, but the best way to learn how to Program in **ANY** Language is to study other Programs. If you have written a Program to accomplish some task, whether it be keeping track of home finances, playing a game, or whatever, in **BASIC**, Machine Language, **"C"**, Pascal, etc., send it in. If you have figured out some of the 'unknown' features of the Color Computer, or its **BASIC** Operating System, send that in. It will help those still trying to figure things out. If we get covered up with good Programs, maybe we'll compile them into a book, or something, but so far we have published a majority of the programs we have received (and you have seen what they were). **NOTE:** If you haven't tried the Music Routine Clell Dildy sent in, you are missing a treat.

## FLEX9 and the 64K MEMORY SYSTEMS

We have been discussing the use of **64K Memory** in the Color Computer in the past Columns, and I'm sure you saw Frank Hogg's Advertisements in last month's issue. Data Comp did not Advertise their **FLEX Conversion for the Radio Shack Disk Controller** at that time because it was not ready for release yet. Data Comp has been running a version of **FLEX** on the Radio Shack Disk System which is similar to the System Frank Hogg is Advertising; that is, **64K Memory** with "Lower RAM" open and the **ROMs** turned off, providing **48K** of usable RAM from **\$0000** to **\$BFFF**,

FLEX at \$C000 thru \$DFFF, and the area from \$E000 up to \$FFF0 containing the Display Screens, Keyboard Routines, etc. Bringing FLEX "up" consists of having it on a normal Radio Shack Disk (which is actually only a "Data Disk") and Loading it into the Computer just like you would Load any normal Program from a Radio Shack Disk.

**Data Comp's FLEX Conversion** offers several features that many Users have asked about.

1. **Multiple Display Screen.** The User has FOUR different Display Screens that can be used; the normal 32 x 16 Screen, a 32 x 24 Screen, a 51 x 24 Screen, or a 64 x 24 Screen. The 32 x 24 is fully usable in the normal fashion. The 51 x 24 Display will require that the COLOR Control be turned DOWN to eliminate the "Color Blur" caused by the R. F. sections of the T. V. Set, but is easily usable with no Color. The 64 x 32 Display is pushing the System Capabilities quite a bit and will require that the User know what the word should be; it is offered for those who want to use it as the situation dictates. ANY of these Display Modes can be called up at will.

2. **Use of Radio Shack BASIC while Operating with the FLEX Operating System.** The normal Radio Shack BASIC can be run just like ANY OTHER FLEX PROGRAM.

3. **Read from or Write to a Radio Shack Disk while using the FLEX Operating System.** You can "GET" a file off of a Radio Shack formatted Disk, or "PUT" a file on a Radio Shack formatted Disk from the FLEX Operating System.

4. **Multiple NEWDISK (or FORMAT).** You can choose the FORMAT when you Initialize a Disk. Options include Single or Double Sided, Sing. or Double Density, the number of Tracks for the Disk Drive you are using, etc.

We will give a report on the Frank Hogg System as soon as we see one.

The **Data Comp FLEX Conversion** requires that you have 64K Memory AND the Version 1.1 BASIC ROM. (Data Comp will supply Modification Instructions with their Conversion Package, and are investigating offering 64K Chips and/or Modification Kits) This is the standard ROM in the newer Color Computers, and is used in ALL of the 32K Models. Any Radio Shack 32K Computer can be modified per the Article in the April '82 issue; other Computers will require a different modification. The Version 1.1 ROM can be purchased for around \$35.00.

Is your 32K System actually good 64K Chips? I have been checking around and the BEST INFORMATION I can come up with indicates that they are PROBABLY NOT GOOD 64K Chips. As near as I can find out, Radio Shack is STILL PURCHASING 32K CHIPS; why they are not good 64K Chips is anybody's guess. I have talked to a couple of Radio Shack Service Center personnel who have been checking them, and they say that a small percentage of the 32K Chips show up as GOOD 64K Chips, even with a simple QUICK Memory Test. They could be rejected by Motorola for several reasons, MANY OF WHICH WOULD NOT SHOW UP without rigorous testing. A bank may have a SLOW ACCESS TIME (which may or may not show up in the Color Computer), it may have an INTERMITTENT TEMPERATURE problem, it may just be BAD, etc. Any Computer User with some experience can assure you that an intermittent only shows up at the worst possible time, like when you have memory full of text with no Backup, and BOOM, GARBAGE!!! The gamble is yours if they check good, because they WERE REJECTED AT MOTOROLA

#### **SUPER "COLOR" WRITER**

Nelson Software Systems  
P. O. Box 19096  
Minneapolis, Minn. 55419

Tape \$49.95  
ROM PAK \$74.95  
Disk \$99.95

Well, "IT" finally arrived, and on a quick look, "IT" IS AN EXCELLENT Product. Yes, I'm referring to Nelson Software Systems long awaited Word Processing Program. This piece of software now allows TRUE Word Processing on the Color Computer, with Printer Control WITHIN THE

TEXT, USER PROGRAMMABLE KEYS, a PROGRAMMABLE FUNCTION, etc. The FULL 128 character ASCII code is available from the Keyboard. SUPER "COLOR" WRITER uses the <CLEAR> Key as a "Control Key" with two stroke sequences; e.g., pressing the <CLEAR> Key and then the <C> Key produces a "Control C" (which, incidentally, is the code output with the Color Computers <BREAK> Key). It supports FULL JUSTIFICATION; Left, Right, OR BOTH LEFT AND RIGHT justified output to the Printer. In general, it is a FULL FEATURED Word Processor which is extremely easy to use.

The Display Screen with SUPER "COLOR" WRITER is similar to the normal Color Computer text Display with TWO important exceptions; 1. the Screen is basically ALL BLACK with GREEN LETTERS, and 2. there is WORD WRAP AROUND. Colored Blocks are used to represent Printer Control Code areas, Format lines, a Centered Line, etc. No, it does NOT have more than 32 characters per line, but the lack of "broken" words and the Black Screen with Green Letters makes it extremely easy to read and interpret. To get an idea of what the Screen looks like, enter a Screen full of text in the Lower Case mode, and then imagine that EVERYTHING else on the Screen is BLACK except the Capital Letters; blanks, spaces, borders, etc. ARE ALL BLACK. It really makes a difference, not seeing Green Borders and spaces.

The whole system is extremely easy to learn and use, and the Commands are normally consistent. For instance, the cursor is moved with the Arrow Keys, left, right, up, down, etc. BUT, a <CLEAR> <LEFT ARROW> moves the cursor to the Left Side, a <CLEAR> <RT ARROW> moves it all the way to the Right. A <CLEAR> <SHIFT UP ARROW> moves you to the beginning of the Text, a <CLEAR> <SHIFT DN ARROW> to the End of the Text. You want to DELETE a Letter? Place the Cursor over it and hit <CLEAR> <D>; it disappears and the Text will adjust, maybe even a complete reformatting. As I said, it is extremely easy to use.

I don't have the room in this Column or the time with the Program to give it full justice yet. I do want to mention a couple of things that have come up with the Initial Programs that were sent out. First, UNPLUG THE JOYSTICKS when you use this Program. They use some of the same PIA sections as the Keyboard, and can create a lot of trouble for a Key oriented Program. Next, a few Programs were shipped out that had a problem with "losing spaces" when you used the cursor control keys (words at the end of a line on the Screen would join with the first word at the beginning of the next line). This "bug" was fixed before the Program was released, but a few copies sneaked out anyway. (Watch what you are doing because the <RT ARROW> will leave a "blank" on the Screen, but it is NOT a "space".) If you have this problem, contact Nelson Software and they will get a good program out to you pronto. The SUPER "COLOR" WRITER has been used to drive almost every type of Printer imaginable, including Daisy Wheels, and with the User Programmable Keys and by being able to embed Printer Controls in the Text, they all play like a champ EXCEPT the Microline 82 series; the solution as worked out with Factory personnel is to set the Internal switches in the Printer so that it DOES NOT ADD LINE FEEDS after a Carriage Return, which you normally need to do with the Color Computer. You use the Format Line command "LFY" (which adds Line Feeds) at the beginning of the Text and SUPER "COLOR" WRITER takes care of the rest.

As I said, this is a Quick Look report; but I will assure you you won't be disappointed if you purchase the SUPER "COLOR" WRITER. It does not give you a "full formatted" Display Screen, but IT DOES GIVE YOU MORE TRUE WORD PROCESSING CAPABILITY than many of the \$300.00 plus Word Processors sold for other Computer Systems, and is very EASY to USE. Also, an enhanced version will be available shortly, with still more features. If you have SUPER "COLOR" WRITER, upgrading will be available for a reasonable fee.



# OS-9 NOTES

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I hope this in somewhat the format that you're after, if not let me know what you would like differently.

The files on this disk are the same as the initial short article that I sent you earlier. There are two versions of HDIR. HDIR1 is the normal BASIC file, HDIR2 is a prettyprinted version as BASIC09 outputs it.

Sorry this took so long but I had to write a terminal program to handle the transfer from OS9 to FLEX.

Just as a point of interest - The article in the M68 file originated on an OSBORNE-1 using WORD-STAR. It was then transferred to a TRS-80 Mod II running CP/M where it was reformatted - then transmitted via phone line to a DEC 2060 - then again via phone line to a GIMIX running FLEX.

Thanks for your patience - and if this works out ok I'll try to make this a regular monthly (or whatever) event. Ray C.

Editors Note: Well, here it is for those of you who wanted an OS9 series.

I hope that YOU THE READERS, who are into OS9 will support this effort. For without input it will fail! I am more than willing to devote space to ANY series of articles, covering any of the systems we use, as long as you want it and support it. The excellent and unselfish efforts of the other regular column contributors such as Ron Anderson, Norm Commo and Bob Nay could not be possible unless you let them know that you do appreciate their effort and time spent in getting it all together so that I can get it in 68 Micro Journal each month.

For you OS9 users here is your chance, let Ray and me know what you think and what you want, for after all, as I have said many times in the past, this is your magazine.

To you Ray, welcome aboard and hope that this is the beginning of a long and happy association. We ALL wish you the very best in this effort and we thank you for sharing your skill with all of us.

DMW - - -

## OS-9 NOTES

Month after month after month I look for news of what's happening with the OS9 operating system. Month after month I see nothing. I see Flex notes. I see Color Computer notes, but nothing for OS9. Guess I'll have to get the ball rolling and then, if the publisher and the readers are willing, I'd be willing to act as a clearing house for OS9 related information.

A little background on myself - I've been a programmer since there have been computers. Lots of years with big IBM systems. More recently with large DEC systems and Micros. My personal systems include SWTP, Apple II, Radio Shack and Osborne I. I spend most of my employer's time working with a beautiful little GIMIX, software switchable between OS9 and Flex. I regularly use seven or eight dialects of BASIC, C, Pascal and several assemblers. I've dabbled in Fort but haven't had time to become proficient with it. On the big system I work with COBOL, RPG-II, Pascal and Macro-20.

The foregoing hopefully shows several things - I'm very curious about computers and what makes them tick - I can maintain a certain objectivity about languages and operating systems - and I've invested more time and money in playing with computers than any sane person could afford. (I hope my wife doesn't read this!)

On to OS9. For those who haven't been exposed to OS9, it is a fully interrupt driven, multi-user, multi-tasking operating system patterned after UNIX. It provides for multiple directories, which can be read like any other file, password security and a timesharing monitor for multi-user operation. Most code running under OS9 is written to be re-entrant and recursive. This allows several users to share the same program at the same time without requiring multiple copies in memory. Recursion also simplifies some kinds of programming tasks. I'll show an example of a recursive program just a little later.

The primary language of OS9 is BASIC09, though there are several others available. I've used BASIC09 heavily, Pascal somewhat and I'm looking forward to the release of the C compiler. COBOL is available but I haven't used it under OS9 as yet.

BASIC09 is an incremental compiler that you work with like an interpreter. That's a little hard to explain, you almost have to experience it to understand - but it's nice. Line numbers are optional except for GOTO's and GOSUB's and you don't find much need for GOTO's. BASIC09 accepts the same general syntax as Pascal as for as structured programming constructs like - WHILE DO - REPEAT UNTIL - LOOP ENDLOOP etc.. You may also run separately compiled procedures with full parameter passing. Any operating system function may be originated from within BASIC09. Listings and screen displays are automatically "pretty printed" that is the system handles indenting of nested if's do's etc..

All in all the OS9 / BASIC09 combination makes about the nicest development package that I've worked with. Easy to use, fast and flexible. As far as speed I haven't run any formal bench marks but I have written a couple real time communications programs in BASIC09 and they handle most medium speed operations.

Now - what I started out to do was to encourage some exchange of information and techniques related to OS9 and BASIC09 - so I present as a starter a program to display or list all the file names on a diskette, indenting to show the proper directory relationships. This also demonstrates the technique of recursive programming that I mentioned earlier.

The program is titled "HDIR" for hierarchical directory (probably miss-spelled that) and it in turn calls "XLIST" which uses "FIXS". HDIR determines what directory to start with and where to send the output. Standard output is always #1 and normally goes to the terminal. In this case if we want to print (or save to disk) we assign a new output path to standard output.

XLIST cheats a little bit. It prints each name - then assumes that it has another directory name and calls XLIST (itself) to process the next directory. If the file is not a dir., then an error on open forces an immediate return and we process the next name in the current directory. This is a simple example of recursive programming. Just think what it would normally require to do this and still handle the indentation etc..

FIXS is a routine to resolve the differences in the way names are terminated in the directory and the way BASIC09 terminates strings. OS9 uses a sign bit - BASIC uses a flag character.

Parting comments - While I feel that the SS50 systems are better in many ways than the competition,

ALL IS NOT ROSES. We need to pull together a little more and get things rolling. I can get more good software FREE from the CP/M and BDS-C users groups than I can BUY for my OS9 system. I'm writing this on a CP/M system because I haven't found an editor or word processor that can begin to compare with MINCE or Wordstar. Show me I'm wrong. Tell me about the good editors and point me to the user's groups. If we don't start getting some PR exposure we'll soon be eating the dust, not only of the CP/M systems, but of the IBM and IBM look-alikes.

So much for the soapbox. Bye.

```

PROCEDURE HDR
0000 REM HDR LIST ALL DIR ENTRIES BELOW START POINT
0030
0031 DIM P:BYTE
0038 INPUT "STARTING DIRECTORY > ",DS
0055 INPUT "OUTPUT TO PRINTER <Y/N> ",AS
0075 IF AS="Y" THEN
0082 INPUT "ENTER OUTPUT DEVICE",XS
0090 CLOSE #1
00A2 OPEN #P,XS:WRITE
00AE ENDF
00B0
00B1 PRINT
00B3 PRINT DS,DATES
00BA PRINT
00BC RUN XLIST(DS,1)
00C9 CLOSE #1
00CE OPEN #P,"/TERM":WRITE
00DE END
PROCEDURE XLIST
0000 REM DIR READ TEST
0010 PARAM DN:STRING(29); LEV:INTEGER
0022
0023 DIM P:BYTE
002A TYPE REC=NAME:STRING(29); MISC:STRING(31)
0045 DIM DREC:REC
004E ON ERROR GOTO 10
0054 OPEN #P,DN:READ+DIR
0060 WHILE NOT(EOF(#P)) DO
0068 GET #P,DREC
0075
0076 IF LEFT$(DREC.NAME,1)>" " THEN
0089 IF LEFT$(DREC.NAME,1)<>"." THEN
009C RUN FIX$(DREC.NAME)
00A9 PRINT TAB(LEV*8); DREC.NAME
00B9 RUN XLIST(DN+"\"+DREC.NAME,LEV+1)
00D4 ENDF
00D6 ENDF
00D8 ENDWHILE
00DC
00DD CLOSE #P
00E3 10 REM ERR RTN
00F0 END
PROCEDURE FIX$
0000 REM STRING FIX
000D PARAM NS:STRING
0014 DIM A,AX:INTEGER
001F DIM AR:REAL
0026 A=ADDR(NS)
0030 AR=A+LEN(NS)
003E AX=AR
0047 IF PEEK(AX)>128 AND PEEK(AX)<255 THEN
005C POKE AX,PEEK(AX)-128
0069 POKE AX+1,255
0074 ENDF

```

# STYLO-Review

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Netick, MA 01760

STYLOGRAPH 2.0, is a combination editor and word processor. It is offered by STYLO SYSTEMS of Williamstown, NY and sells in the \$300 price range. Versions are available for FLEX(1), UNIFLEX(1).

## THE EDITOR

The editor portion of STYLO is fully cursor driven. It has three modes, the SUPERVISOR mode, the ESCAPE mode and the INSERT mode.

The SUPERVISOR mode is entered when you call the editor from the operating system. It has a variety of options

- edit (enter the ESPACE mode)
- print the text buffer
- save the text buffer and return to DOS
- save the text buffer
- save text buffer from cursor to marker
- return to DOS
- insert a file at the cursor
- erase the text buffer without saving it
- use a special letter quality printer
- use a tty printer
- pass a command to DOS
- spool the text buffer to a file
- use a proportional print wheel
- get new text from input file

which are selected from a menu by moving a cursor up or down the list to the desired option and hitting <cr>. If the command needs additional input it will prompt you, detailing the possible responses and any defaults. It really couldn't be much easier.

The ESCAPE mode opens a window into the text buffer over which you can move the cursor and make changes to the text. All ESCAPE commands are invoked by a single keystroke using one of the "standard" keys on a keyboard. Therefore STYLO works on just about any terminal without modification. Even cursor movement is controlled with standard keys. They are grouped in a cluster around the "K" key and include

- move cursor to start or end of line
- move cursor up or down one row
- move cursor left or right one column
- scroll edit window up or down one line
- scroll edit window up or down one screen

The ESCAPE mode also lets you edit the text with such commands as

- overwrite the character under the cursor
- insert a character into the text
- delete the character under the cursor
- delete the word "under" the cursor
- delete the current line
- save text from cursor to mark
- withdraw saved text
- deposit the saved text
- zap text from cursor to marker
- find a string
- find and replace a string
- go to page N

And of course some command don't fit either of those categories such as

- enter the INSERT mode
- get help
- display character attributes
- see the current page status and parameters
- name the last error which rang the bell
- remove all tabs
- set tab(s)
- remove tab(s)

The INSERT mode lets you insert text into the buffer. In this mode, the line that you are entering text into is depicted with a series of dashes (in inverted video, if your terminal supports it). As you type along, the dashes are over written with the new text. You always know where you are with respect to the current line, whose length can be set by you. Another nice feature is

the that you don't need to enter <cr>. Just keep typing. STYLO will take any word that might get split and move it onto the next line. And if you're in the justify mode, STYLO will go back to the previous line and insert extra spaces between words to make the line fill out to the specified length. Characters are deleted with the backspace key. In fact, you can backspace over a previous line or the whole text.

The INSERT mode also lets you modify character attributes for

- boldface
- underline
- overline
- subscript
- superscript

printing, or any reasonable combination. When a character is given an attribute that can't be displayed on a video terminal, that character is inverted. To see what attributes these characters have, you invoke a special command which displays the text buffer with all special characters replaced by their respective attribute code. Neat eh? And STYLO is interrupt driven with its own terminal I/O drivers so you can type along as fast as you want and not drop any characters as the screen is redrawn.

Quite a bit of thought has been given to the operator interface regarding convenience. Commands are mnemonic wherever possible and, as I mentioned earlier, the cursor movement keys are clustered around the "K" in such away as to schematically depict what action they will incur. As an example

```

I
JKL
,

```

control the elementary cursor movements as follows

- I - go up one row
- J - go left one column
- L - go right one column
- , - go down one row
- K - toggle between start and end of line

#### THE WORD PROCESSOR

The word processor part of STYLO is just as extensive and well thought out as the editor. Commands appear at the start of the line and consist of a comma followed by the command name and possibly a numeric value. They are, for the most part, mnemonic, such as ",pp" to start a new paragraph.

Commands are broken down into vertical formatting, horizontal formatting and miscellaneous formatting. By category they include

- vertical formatting
  - set page length
  - new page
  - set page number
  - send top of form (to printer)
  - define page header
  - define page footnote
  - space N lines
  - set N spaces per line
  - vertical tab to line N
  - need N lines on same page (save N lines)

- horizontal formatting
  - center N lines
  - right or left justify N lines
  - justify (even left and right edges)
  - no justify
  - set line length

- indent N spaces
- indent N spaces for one line
- set left margin (for printer)
- set N characters per inch (print param.)
- start proportional printing
- stop proportional spacing (normal spacing)

#### miscellaneous formatting

- new paragraph
- paragraph needs N lines on same page
- space N lines on new paragraph
- indent N characters on new paragraph
- boldface strike N times at printout
- pad character C for non-paddable spaces on printout
- mail merge character C
- print character C for delimiting print strings
- comment line

Paragraphing and many of the horizontal formatting commands format on the terminal as they will when printing. Whereas vertical formatting is ignored on the terminal since that would diminish the amount of text that you could see in the window at one time.

The average person will be hard put to challenge these capabilities. Indeed, even the sophisticated user will find STYLO suitable for all but the most demanding tasks.

#### THE PACKAGE

The whole STYLO package is thoroughly done. I would recommend that anyone who contemplates selling software should buy STYLO and see how it's done right.

STYLO comes with a manual and a disk. The manual is really slick. There are chapters that cover each of the three mode and their commands. A tutorial to get you started. There are chapters and appendices for configuring STYLO for your system and a handy keyboard layout with associated STYLO commands.

The disk comes with some 21 files. They include the STYLO editor; six "help" files, each of which contains a synopsis of some portion of STYLO and are called from STYLO when you need help; a series of proportional spacing tables for various printers; I/O driver source files; and a special patching program STYFIX.

STYLO comes configured to work with 22 different terminals and 5 different printers. If your terminal and printer don't match the defaults, you can do one of two things. You can change them via command line options when you invoke STYLO. Or you can use STYFIX, which is also menu driven, to patch in the new defaults.

#### OPINIONS

I am sold on STYLO. I have rarely used any other editors since Don Williams sent me a copy of STYLO to review. However, all was not totally rosey. For any program that attempts to do as much as STYLO does, a few subtle surprises are not totally unexpected. I found two.

The first bug was potentially catastrophic since recovery involved RESET! STYLO has a fixed number of pages (which you determine) regardless of how much memory is available. If you don't, and you are in the insert mode and attempt to go beyond the last page, STYLO goes off to never-never land. I reported this bug to STYLO SYSTEMS. On a follow up call I was told that this bug has been fixed.

The second bug may really be due to slight differences between the various versions of FLEX that are available.



STYLO was developed on GIMIX-FLEX, whereas I run STYLO under SWTP-FLEX. While editing, I would decide to save a file, which totally fit in memory. The save would be made to the disk from which the program was loaded. So far so good. Then I would change disks to back up the file while still in the editor. If a ".BAK" of the file existed on the disk then a few blocks of the file would get saved and up would come the error "NO MORE DISK SPACE". Inevitably, the free chain was blown away. I have talked with STYLO SYSTEMS about this problem. They didn't think that I had done anything illegal, and so they are checking into the problem. If you are running version 2.7:3 SWTP-FLEX be on your guard.

In summary, the package is well done from start to finish. Moreover, they have been helpful when I called with problems, some of which were really my own fault. So kudo's and an "AAA" to STYLO SYSTEMS for a very fine package.

(1) FLEX and UNIFLEX are trademarks of Technical Systems Consultants.

## ST02-review

A Review by E. M. (Bud) Pass, Ph.D.

Many of us have bought (or been given) old "junkier" terminals which once cost large amounts of (less inflated) dollars but have "died" and were replaced with more recent terminals. Others are looking for a "cheap" terminal and already have or can get a surplus CRT monitor, keyboard, and power supply. With some effort and a (reasonably) small amount of money, you can now restore that old terminal to working order or use those surplus components to build a new terminal.

The Southeastern Micro System ST-02 terminal controller board can help in both of these situations. The ST-02 board provides a means of logically combining a parallel keyboard and CRT to form a computer terminal. The board has the following features, according to the manual:

It is based upon the Motorola MC6802 microprocessor.

It uses a Motorola MC6845 CRT controller to drive a NTSC 8/W monitor.

It uses a Motorola MC6850 ACIA for external communications, such as with a modem or computer.

It uses Motorola MC6821 PIA's for attachment of a parallel keyboard and a parallel (Centronix) printer.

It uses a switch-selectable on-board Baud rate generator to support Baud rates up to 9600 Baud.

It has the provision for attachment of a speaker for tone generation.

It requires +5 volts at 2 amps, +12 and -12 at 0.5 amp, all regulated.

It provides for a 2K byte controller program and for a 2K byte user-defined character set, both in 2716 PROM's; an ADM-3A simulation program is provided in the standard optional PROM.

It is configured for straight-thru-cable operation when used with most RS-232-C and Centronix devices.

The construction instructions are not like those from Heathkit but are adequate for the experienced kit-builder. Beginners would be well advised to buy the assembled and tested unit. It is not a simple board to build, containing 38 integrated circuits, 20 resistors, 25 capacitors, and miscellaneous parts. Its physical size is about 7.5 inches by 8 inches, which should allow mounting in most monitor-base cases and in some keyboard cases. The instructions call for a multiple-phase construction, with correct power and logic values checked at the end of each phase. I have built two ST-02 boards. The first was an early prototype model and is working in an old SMC 2000 terminal case. The problems encountered in the older were avoided in the redesign of the new board. I plan to mount the new board in the base of an old INFOTERM monitor or below a keyboard.

Southeastern Micro Systems will provide a 2716 EPROM containing a default program which causes the terminal board to simulate and extend ADM-3A terminal. Southeastern Micro Systems will also provide a 2716 EPROM containing a default user-defined character-set generator; the other character-set is contained in a 6674 ROM. The user who has the need and capability to do so may customize either of them to satisfy other requirements, such as simulation of another terminal or such as a dedicated application. The EPROM contents are documented in the manual provided.

As noted earlier, the Southeastern Micro System-supplied program EPROM and character-set ROM/EPROM cause the ST-02 to simulate an ADM-3A terminal, when attached to an appropriate parallel keyboard, CRT monitor, and power supply. The primary limitations are concerned with relative speed of operation. The ST-02 is not capable of running at speeds higher than 9600 Baud and, at speeds higher than 600 Baud, either timing characters must be inserted after Clear-Screen and Reset-Initial-State commands or the RTS-CTS connection must be made between the terminal and modem/computer to which it is attached. The primary extensions are related to the printer port, Inverse video, screen handling, and ROM/EPROM selection for character-set generation. If a printer is used, the RTS-CTS connection must also be made to avoid over-running the ST-02 board during printer operation.

The SMS ST-02 board and standard EPROMs provides the following switch options:

CRT screen format -  
16x32, 16x64, 20x80, 24x80  
Cursor format -  
block, underline, blink/nonblink  
Communications line characteristics -  
7/8 data bits, even/odd/no parity, 1/2 stop bits  
Duplex mode -  
half, full  
Communications line speed -  
150, 300, 600, 1200, 2400, 4800, 9600 Baud  
Default character generator -  
ROM, EPROM

The standard program EPROM provides the following control-code commands in support of its ADM-3A simulation and extensions:

HEX	ASCII	FUNCTION
07	BEL	Sounds Alarm
08	BS	Backspace
0A	LF	Line Feed
0B	VT	Reverse Line Feed

0C	FF	Forespace
0D	CR	Carriage Return
0E	SO	Unlock Keyboard
0F	SI	Lock Keyboard
1A	SUB	Clear Screen
1B	ESC	Start Sequence
1E	RS	Home Up

ESCAPE SEQUENCES		
HEX	ADM-3A	FUNCTION
1B/3D/row/col	yes	Position cursor to (row,col)
1B/61	no	Reset to Initial state
1B/63	no	Send input to printer
1B/64	no	Stop output to printer
1B/69	no	Flip Inverse video
1B/6E	no	Read cursor position
1B/70	no	Parallel CRT and printer outputs
1B/72	no	Flip character generators
1B/73	no	Print screen
1B/78	no	Display all characters

In terms of the use of the board as an ADM-3A terminal simulator and in terms of its use in special dedicated applications, I would rate the ST-02 as AA.

The Southeastern Micro System ST-02 is manufactured and marketed by the following company:

Southeastern Micro Systems, Inc.  
1080 Irls Drive  
Conyers, GA 30207  
Telephone: 404-922-1620

The pricing structure is as follows:

Assembled and Tested	\$325.00
Complete Kit	275.00
Bare Board & EPROM	100.00
Bare Board	75.00
Character Generator EPROM	15.00
Program EPROM	25.00
Program source on Disk	40.00

## UniFLEX & RSTS

INTERCOMMUNICATION BETWEEN UNIFLEX  
AND RSTS

by

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### ABSTRACT

This paper describes a method for interfacing a Southwest Technical Products SO/9 computer using the Uniflex operating system and a Digital Equipment Corporation PDP 11/40 using the RSTS operating system. The interfacing pro-

grams were developed in 6809 assembly language, UNIFLEX BASIC, and DEC BASIC-PLUS. Using these programs, ASCII files may be exchanged between the two systems using the RS-232C serial communications protocol.

### INTRODUCTION

The development of microcomputers has provided a cost effective method for data collection and operational control in medically remote settings. The 16-bit word microcomputer such as the Southwest Technical Products (SWTP) SO/9 provides multi-terminal multi-user capabilities for less than \$9,000. Coupled with the appropriate software such systems have the capacity to manage the small medical office or outreach clinic in the areas of business, patient care, and physician needs.

In some medical settings, physicians are supervising, through remote protocols, allied health personnel in outreach clinics. Using the microcomputer in this setting holds the promise of assuring the physician a set standard for patient treatment. In doing so, transmission of data to the physician over communication lines becomes important in daily procedures.

At present the Department of Biomedical Engineering and Computer Medicine and the Department of Preventive Medicine and Community Health at the Texas Tech University Health Sciences Center School of Medicine, Lubbock, Texas, are developing a medically remote computerized information system. In order to meet the system intercommunication needs a method was developed for transferring files between the two computers currently available to the project.

### The Systems

Two computer systems were involved. A SWTP SO/9 and a DEC PDP 11/40. The SWTP SO/9 consisted of a 6809 CPU, 128K 8-bit memory, two double-sided double-density floppy disk drives, an Epson MX-80 parallel printer, and six RS-232C ports. The DEC PDP 11/40 was configured with 124K 16-bit memory, 2K cache memory, two 80 mega byte disk drives, 32 RS-232C ports, a tape drive and a line printer. Technical Systems Consultants, Inc. UNIFLEX operating system and UNIFLEX BASIC were used with the SWTP SO/9. The DEC

RSTS operating system and BASIC-PLUS were used with the DEC PDP 11/40.

The communication hardware for the SWTP SO/9 was the MP-S2 dual serial interface and for the DEC PDP 11/40 it was the DH, 16 line, programmable, asynchronous, serial line multiplexer. On the SWTP side it was necessary, for communications, to raise line 20 high. This was accomplished by tying line 20 to line 12. The baud rate was set at 1200 on both systems.

#### UNIFLEX PORT CONTROL

The intercommunication design required the UNIFLEX system to behave like a terminal to the RSTS system. To accomplish this the SO/9 port being used had to be disabled as an interactive port to UNIFLEX and the echo feature of the port turned off. The first was a simple matter. Using the editor, the ttylist was changed to reflect a minus (-) on the appropriate port. When this was done, UNIFLEX would not respond to input as an attempt to log-on to the UNIFLEX system. For use in multiuser mode by non "system" users the perms on tty01 should be set to o+rwX and u+rwX.

Turning off echo to the port was more involved. It was not possible to use the ttyset to do this as the port was disabled to log-ons. Attempting to use ttyset prior to disabling the port did not work either. Furthermore, it was not possible, as the system manager, to use ttyset on any port except the systems port. The solution arrived at, with good assistance from Technical Systems Consultants, Inc., required a machine language program using the system commands of ttyget and ttyset to turn off the echo flag. In addition, in order to keep this flag turned off, it was necessary to enter BASIC and run the first BASIC program from the machine language program. If this was not done, then as soon as the machine language program was finished UNIFLEX would automatically reset the echo flag on. In addition, the CRMOD flag was turned off to prevent a line feed from being transmitted after a carriage return.

#### echoff.bc

The assembly language program required to turn off echo and keep it off until the output port is closed is given in LISTING 1. This program was entered

using the editor then assembled without line numbers as echoff.bc using the utility command "asmb". Lines 5 thru 10 label six buffer locations needed by ttyget. The buffer was labeled ttybuf in line 57. Lines 12 thru 19 equate labels to an expression, in this case binary bit patterns. Line 20 provided access to the system library. Lines 31 thru 38 turned off ECHO and CRMOD, executed BASIC and the appropriate compiled BASIC program which was, in this case, signon.bc, defined in line 51. Lines 41 thru 45 are for detecting errors and lines 47 thru 56 established the file opening routines for the tty port which was tty01, the BASIC program, and the error messages. To use any other port, change all occurrences of tty01 to tty-- where -- is the desired port number.

#### SIGN-ON PROGRAM

##### signon

Using the UNIFLEX system as a terminal to the RSTS system requires a sign-on program. The program developed for this purpose is given in LISTING 2. It was compiled and run under UNIFLEX BASIC as signon.bc. A nice thing under UNIFLEX is that any output port can be handled as if it were a file. Hence, BASIC commands such as OPEN, PRINT#, and INPUT# are acceptable. Using this feature, line 20 opened the communication port. The RSTS system responded to a CHR\$(3) as a "CTRL C" and this was used to terminate any activity that might have been left on the RSTS system due to a programming error. Experience indicated that development of transfer programs will cause errors; hence, this was a way of recovering without RSTS operator intervention. The first BYEF then assured a proper RSTS sign off. The second BYEF caused RSTS messages to occur as the port was waiting for a sign-on. Under RSTS, if the port was not up, then several messages were sent by RSTS, the last of which was "Bye." This word was looked for as it indicated that the DEC port was clear and ready for accepting a sign-on. If "Bye" was not detected then the procedure could be terminated by the UNIFLEX operator using CTRL "C" and echoff.bc re-run. Also, RSTS transmitted a line feed as the first character of each line. Hence, prior to searching for a string or printing on the UNIFLEX system, the first character was removed from any RSTS transmission to pre-



vent double spacing on the CRT. This was done as shown in line 80.

Upon detecting "Bye" the RSTS sign-on procedure was followed. First, "Hello account #" was sent, then the password. It was important not to look for the RSTS question of "Password" prior to transmitting the password as the procedure would hang up. This occurred because when RSTS transmitted "Password" it did not send a carriage return. Hence, UNIFLEX did not recognize that a line had been received. However, RSTS was looking for the password at that point. Therefore, sending the password completed the sign-on. After sign-on, "Ready" was searched for and, when found, then data could be transferred by chaining to the desired UNIFLEX BASIC program.

Lines 170 through 220 provided the operator the choice of receiving a RSTS file by the UNIFLEX system or sending a UNIFLEX file to the RSTS system. This was done by chaining to "read.bc" or "send.bc" both being compiled BASIC programs.

Two BASIC programs were required to transfer files between the two systems. These were called "read" and "send". Both were compiled. These programs contained a subroutine used to write a BASIC program on the RSTS system which was then used to send or receive data as required. Using this method, the UNIFLEX programmer could develop any type of transfer programs desired without having to have a program resident on the RSTS system.

The programs to be described print on the UNIFLEX terminal all transmissions received from the RSTS system. Hence, it was easy to follow the transfer procedure. Since the RSTS system echoed all UNIFLEX transmissions, the transfer programs could also be followed as they were written on the RSTS system.

In both programs it was necessary to open the transfer port, tty01, even though it had been opened in echoff and not closed. UNIFLEX appeared to close the port upon executing BASIC; hence the requirement to re-open it. Once the operation of the programs was understood, the extraneous input and print statements could be removed.

#### read

The program used to transfer a RSTS file to the UNIFLEX system was called "read" and is given in LISTING 3. It was compiled

as "read.bc". The transfer port was opened in line 30. In lines 40 and 60 the names of the two files data was to be transferred between was asked for. Line 70 then opened the appropriate UNIFLEX transfer file. In line 80 the RSTS program writing subroutine was called. Lines 230 through 480 wrote the RSTS BASIC program. Lines 90 through 170 controlled the data transfer. Lines 180 through 200 signed off the RSTS system, closed the UNIFLEX files and terminated the program.

In line 150 a "SEND-1" was sent to the RSTS program. This was looked for in line 330 which wrote RSTS program line 26. Upon receipt of "SEND-1", the RSTS program inputted a line from its file and sent it via a print statement to the UNIFLEX system. Using this prompting method kept the two systems synchronized. When the RSTS system arrived at the end of its file a "???" was sent. This was detected in line 130 and used to terminate the program.

#### send

The program used to transfer a UNIFLEX file to the RSTS system was called "send" and is given in LISTING 4. It was compiled as "send.bc". The transfer port was opened in line 30. In lines 40 and 60 the names of the two files data was to be transferred between was asked for. Line 70 then opened the appropriate UNIFLEX file. In line 80 the RSTS program writing subroutine was called. Lines 240 through 420 wrote the RSTS BASIC program. Lines 90 through 150 transferred the UNIFLEX data. Again, as in "read.bc" a "SEND-1" was used to synchronize the two systems and a "???" was used to terminate transmission and properly exit the receiving program.

#### COMMENTS

In use this set of programs successfully transferred both BASIC programs and data files between the two systems. Using the UNIFLEX editor it was straightforward to make global changes to BASIC programs so they are compatible between systems, i.e. LEFT\$ to LEFT. Data files may need some adjustments since an "INPUT LINE" transferred carriage returns and line feeds. The user can easily make these changes in line 140 of read.bc and 340 of send.bc.

If a disk containing these programs is desired, the author will furnish same

for \$49.95 which includes shipping. Included are object code programs as well as compiled programs. Funds received are used to support computer medicine research in health care delivery. Please order prepaid.

LISTING 1 echoff

```

1.  *this program sets echo off for tty01
2.  *
3.  *buffer definitions for tty01 & tty02
4.  *
5.  *tty01 rdb 1
6.  *tty02 rdb 1
7.  *tty01 rdb 1
8.  *tty02 rdb 1
9.  *tty01 rdb 1
10. *tty02 rdb 1
11. *
12. *
13. *tty01 equ 30000001
14. *tty02 equ 300000010
15. *tty01 equ 300000100
16. *tty02 equ 300001000
17. *tty01 equ 300100000
18. *tty02 equ 301000000
19. *tty01 equ 310000000
20. *
21. *
22. *open tty01 for read
23. *start lds a1open
24. *ave lnds
25. *hes unisr
26. *std fd
27. *ave tty01tty02
28. *ave tty01
29. *lde tty01tty01
30. *
31. *
32. *
33. *
34. *
35. *
36. *
37. *
38. *
39. *
40. *
41. *
42. *
43. *
44. *
45. *
46. *
47. *
48. *
49. *
50. *
51. *
52. *
53. *
54. *
55. *
56. *
57. *
58. *

```

LISTING 2 read

```

10 read compiled as read.bc
20 read used to transfer a RSTB file to a UNIFLEX file
30 open "/dev/tty01" as 1
40 input what is the name of the RSTB file the data is to come from -- "rs
50 print
60 input what is the name of the UNIFLEX file the data is to be put in -- "rs
70 open u8 as 2
80 gosub 240
90 print "RUN"
100 input line a1,asprint right(a1,10)
110 if instr(a1,"OK?") then 150 else 100
120 input line a1,asprint right(a1,10)
130 if instr(a1,"OK?") then 150 else 100
140 print a1,asprint right(a1,10)
150 input line a1,as
160 print "SEND"
170 input line a1,asprint right(a1,10)
180 print "SEND"
190 input line a1,as
200 print a1
210 close 1,2
220 goto 300
230
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
460
470
480
490
500

```

LISTING 3 signon

```

10 read signon compiled as signon.bc
20 open "/dev/tty01" as 1
30 print "SIGNON"
40 print "SIGNON"
50 print "SIGNON"
60 input line a1,as
70 print a1,asprint right(a1,10)
80 if right(a1,10) = "SIGNON" then 100 else 60
90 read CTRL-C to exit at this point
100 print "ready for signon"
110 input to continue input any key
120 print "HELLO 20,20"
130 print "HELLO 20,20"
140 input line a1,as
150 print a1
160 if right(a1,10) = "SIGNON" then 170 else 160
170 print "The PDP 11/40 is ready"
180 print "To read a file from RSTB to UNIFLEX input --"
190 input to send a file from UNIFLEX to RSTB input a -- "rs
200 if instr(a,"OK?") then 180
210 if instr(a,"OK?") then 180
220 chain "send.bc"
230 end

```

LISTING 4 send

```

10 read send compiled as send.bc
20 read used to transfer a UNIFLEX file to a RSTB file
30 open "/dev/tty01" as 1
40 input what is the name of the UNIFLEX file the data is to come from -- "rs
50 print
60 input what is the name of the RSTB file the data is to be put in -- "rs
70 open u8 as 2
80 gosub 240
90 print "RUN"
100 on error goto 160
110 input line a1,as
120 print right(a1,10)
130 if instr(a1,"OK?") then 140 else 110
140 input line a1,as
150 print a1,asprint right(a1,10)
160 resume 170
170 print "SEND"
180 input line a1,asprint right(a1,10)
190 if right(a1,10) = "SEND" then 200 else 180
200 print "SEND"
210 input line a1,asprint right(a1,10)
220 close 1,2
230 goto 430
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
460
470
480
490
500

```

## TRANSFER

TRANSFER- Computer link program

RANDAL LILLY N3ET  
752 S. CARLTON ST.  
ALLENTOWN, PA. 18103

For the hardware hacker, there is always the temptation to build a dedicated controller for printer spooling etc. For the software people, that old computer is a real waste, just sitting there collecting dust. COST—that is the problem when it comes to adding a CRT or disk drive to that other computer.

TRANSFER is a program that allows the main computer (SWTCP 6809) to transfer and run programs on a remote CPU. The remote CPU is a standard 6800 or 6809 computer with a MIKBUG or SBUG-E ROM and serial port. The link is an RS-232 cable and data is transferred in binary using the SI 13 etc format. After the user program is transferred, TRANSFER enters a TALK mode making the main computer transparent to the CRT terminal and

remote CPU. The user program must be a standard .BIN disk file.

In my application, a homebrew 6809 CPU with SBUG-E and eight 64k rams, wire-wrapped on an S-100 prototyping board acts as a radioteletype (RTTY) controller. The RTTY program is downloaded from a disk drive of the main computer to the RTTY computer using TRANSFER. The RTTY CPU then copies the local 2-meter amateur radio TTY repeater with the main computer turned off. Messages are saved in the RTTY CPU's 64k memory. Every couple of days, TRANSFER is again used, but no user filename is specified, and TRANSFER immediately goes into the TALK mode. This allows the saved messages to be read, and allows normal RTTY transmit and receive using the CRT terminal.

Now, for those of you still with me, things may be beginning to tick. TRANSFER is fantastic when it comes to de-bugging either hardware or software, as it is no longer necessary to re-blow a PROM for changes. You can also make the remote computer do a completely different task. Going to extremes, TRANSFER could even be connected to a MODEM and used to transfer or talk to a very remote computer. When TRANSFER is used with a cassette interface, you can copy BIN files directly from disk to cassette tape. It even outputs an 'L' to start the loader and sets up the 'GO' address. Lacking a filemap utility? Use TRANSFER to see where that disk file is going into memory.

Figure 1 is a diagram of my RTTY setup. As can be seen, the remote CPU runs on its own, and uses the main computer's disk drives and CRT terminal to load and run programs. The 64k ram saves 3 hours of full speed 45 baud RTTY, 2 or 3 days worth from the local repeater, and with a 2 character compression scheme that I use, multiple RTTY pictures (PIX) may also be saved.

Now, by simply resetting the RTTY CPU, and down-loading a PRINTER SPOOLING program the remote CPU becomes a printer driver, freeing up the main CPU for other uses. Of course, after program debugging using TRANSFER, your program may be put into PROM making a dedicated controller out of the remote CPU.

To use TRANSFER, first reset the remote CPU, then type the following;

TRANSFER,FILENAME.BIN

TRANSFER defaults to a .BIN file, so the .BIN is really not needed. TRANSFER prints the addresses of the blocks of

data as it goes to the remote computer. If a '?' is returned indicating a bad load in the remote CPU, it is reported and the last load address is reported. When all goes well, TRANSFER enters a TALK mode which ties the CRT terminal to the remote CPU. To exit transfer, type a control S (^S) and the main computer is returned to FLEX. If you need to use TRANSFER's TALK mode, but don't want to down-load, simply don't specify a filename; TRANSFER reports a file spec error and goes into the TALK mode.

One thing to watch out for. If you do not reset the remote computer before down-loading a program, TRANSFER assumes all OK and appears dead after reporting the transfer address. Actually, the remote CPU is dead. In this case, type a control S, reset the remote CPU and try again.

When down-loading a program, TRANSFER first sends an 'L' to put the remote CPU in the loader state. Then it sends the binary in an SI 13 .... format and tacks on a checksum for each disk data block. When end of file is reached, TRANSFER puts the transfer address (if there is

one) in the remote CPU's stack at \$DFBE. This address is only valid after a reset of the remote CPU. Now the TALK mode allows you to use the SBUG routines or type 'G' to start the remote running.

For a 6800 (remote) CPU, lines 85 and 90 show the changes needed. Line 91 may give a VALUE TRUNCATED ERROR. This is OK since we want to truncate (make 1 byte) the partial checksum value loaded into the 'A' register.

The following example of TRANSFER loading itself into the remote CPU shows what you should expect.

---TRANSFER,0,TRANSFER.CMD

TRANSFER SBUG FORMAT:  
C100 C100 C1B C7FD  
TRANSFER ADDRESS IS \$C10E  
-TALK MODE- "S TO OUT"

>M DFBE  
- DFBE C1 .  
- DFBE OE  
>P DFBE-DFBE  
\$105DFBE C10E8E  
>G

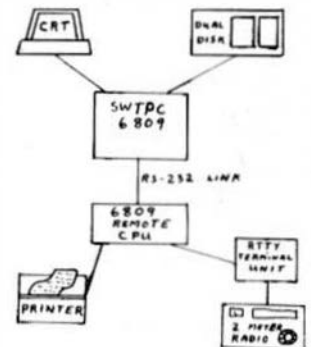


FIGURE 1 - Radio Teletype setup

TRANSFER 3-7-82 R. LILLY

3-7-82 6809 Software Page 1

```

1      NMN TRANSFER 3-7-82 R. LILLY
2      * TRANSFER CODE FROM DISK TO REMOTE CPU
3      * WHEN ENTER TALK MODE
4      * NO FILE NAME = TALK MODE DIRECTLY
5      * DEFAULT TO .BIN
6      OPT
7      PAG
8
9      C040 SFCB EQU SC040
10     C003 M00MS EQU SC003
11     C010 PUTCHM EQU SC010
12     C01E PSTRM EQU SC01E
13     C02D GETFIL EQU SC02D
14     C033 SETEXT EQU SC033
15     C03F RPTERR EQU SC03F
16     C045 OUTADR EQU SC045
17     04 6 FMS EQU S0406
18     C0D0 PORT EQU SC0D0 LINK OVER PORT 0
19     F804 INCM EQU SF804 SBUG INPUT
20     FB08 INCM EQU SF808 SBUG INPUT CHECK
21     F80A OUTCM EQU SF80A SBUG OUTPUT
22
23     C100 VER C100 VEREND
24     C102 20 20 52 2E VEREND
25     C10F VEREND
26
27     C100 ORG VER C100 VEREND
28     C100 7E C10E ORG VER C100 VEREND
29     C103 7E C102 ORG VER C100 VEREND
30
31     C106 E000 ACIAD FDB PORT=1
32     C106 E001 ACIAD FDB PORT=1
33     C10A 0000 STRADR FDB 0
34     C10C 00 BYCNT FDB 0
35     C10D 00 ERRFLG FDB 0
36

```

```

37 C10E 80 C265 START JSR ACIA1 INIT PORT
38 C113 8E C278 LDX #HEADR
39 C114 8D C01E JSR PSTRNG
40 C117 8E C8A0 LDX #SFCB
41 C11A 8D C020 JSR GETFIL
42 C11D 1025 00A1 LBDS ERHND TALK MODE ON FILE SPEC ERROR
43 C121 86 00 LDX #0 BFN DEFAULT
44 C123 8D C033 JSR SELEX OPEN READ
45 C126 86 01 STA 0,X
46 C128 A7 00 BSR DUFMS OPEN FILE
47 C12A 8D 6F LDX #SFF
48 C12C 86 FF STA 59,X SPC COMP OFF
49 C12E A7 8B 38 LDX #L LOAD CMD
50 C131 86 4C JSR DUFMS "L" TO REMOTE CPU
51 C133 8D C245 EK02 BSR DUFMS CHECK FOR XFER FLAG
52 C136 8D 63 BSR DUFMS CHECK FOR FILE START FLAG
53 C138 81 16 CMPA DUXADR GET & DISPLAY FILE ADDR
54 C13A 27 32 BCD CMPA #2
55 C13C 81 02 BNE EK02
56 C13E 26 F4 BSR ADDRES
57 C140 8D 1C LDX #20
58 C142 84 20 JSR PUICHR
59 C144 8D C018 BSR DUFMS
60 C147 8D 52 STA 6VICH1
61 C149 B7 C10E JSR PUNCH PUNCH BLOCK OF DATA
62 C14C 8D C1FE LDX #L TEST FOR ERRORS
63 C14F 86 C10D LDX #L PUNCH WAS O.K.
64 C152 27 E2 BCD EK02
65 C154 8E C29E LDX #ERRMSG REPORT ERROR
66 C157 8D C01E JSR PSTRNG LOCATION
67 C15A 8D 0C BSR OUTAD1
68 C15C 20 59 BRA CLOSE1
69
70 C15E 8D 38 ADDRES BSR DUFMS
71 C160 87 C10A STA STRADR
72 C163 8D 36 BSR DUFMS
73 C165 87 C10B STA STRADR+1
74 C168 8E C10A OUTAD1 LDX #STRADR
75 C16B 7E C045 JMP OUTADR ADDRESS OUT TO CRT
76
77 C16E 8E C2CA DUXADR LDX #TRMSG
78 C171 8D C01E JSR PSTRNG
79 C174 8D 8E BSR ADDRES
80 C176 8E C294 LDX #51 GET & DISPLAY XFER ADDR
81 C179 8D C276 JSR POATA1 (S1) HEADER
82 C17C 86 05 LDX #5
83 C17E 8D C231 LDX #0 (S1) BYTE CNT
84 C181 8E DFBE LDX #508E STACK ADDR FOR GO
85
86 C184 8D C229 * LDX #SAD42 FOR 6800 REMOTE
87 C187 8E C10A JSR OUTAH (OFBE) GO VECTOR
88 C18A 8D C229 JSR OUTAH (XXXX) ADDRESS OF GO TO
89
90 * LDA #05 MAY TRUNCATE
91 C18D 86 A2 * LDA #05+SA0+SA2 FOR 6800 REMOTE
92 C18F 8B TRUNC LDA #05+0DF+5BE
93 C192 8B C10A ADDA STRADR
94 C195 43 C10B ADDA STRADR+1
95 C196 8D C231 COMA
96 C199 20 9B JSR OUT2H (KK) CKSUM
97
98 * DO FMS CALL
99 C19B 8E C840 DDFMS LDX #SFCB
100 C19E 8D 0406 JSR FMS
101 C1A1 27 1E BEQ RTS1 O.K.
102 C1A3 A6 01 LDX 1,X
103 C1A5 81 08 CMPA #8 END OF FILE?
104 C1A7 27 21 BEO ENDFIL
105 C1A9 8D C03F RPTER1 JSR RPTERR
106 C1AC 8D 03 BSR CLOSE
107 C1AE 7E C003 WAR SE JMP WARMS BACK TO FLEX
108
109 C1B1 8E C299 CLOSE LDX #59
110 C1B4 8D C276 JSR POATA1
111 C1B7 8E C840 CLOSE1 LDX #SFCB
112 C1BA 86 04 LDX #4
113 C1BC A7 00 STA 0,X
114 C1BE 7E 0406 JMP FMS CLOSE FILE
115
116 C1C1 39 RTS1 RTS
117
118 * FILE SPEC ERROR HANDLER
119 C1C2 8E C2E0 ERHND LDX #FILERR
120 C1C5 8D C01E JSR PSTRNG
121 C1C8 20 08 B A TALK
122
123 C1CA 8E C2F7 ENDFIL LDX #PRMPT
124 C1CD 8D C01E JSR PSTRNG
125 C1D0 8D 0F BSR CLOSE
126 C1D2 A6 FF C106 T K LDX #ACIAC
127 C1D6 85 01 BITA
128 C1D8 77 08 BEO TALK1 NO REMOTE CHR RCVD
129 C1DA A6 FF C10B LDX #ACIAD GET REMOTE CHR
130 C1DE AD FF F80A JSR [OUTCHM] SEND CHR TO CRT
131 C1E2 AD FF F80B TALK1 JSR [INCHM]
132 C1E6 27 EA BEO TALK NO CRT CHR RCVD
133 C1E8 AD FF F80A JSR [INCHM] GET CRT CHR
134 C1EC 81 13 CMPA #513 "S" FOR STOP, RETURN TO FLEX
135 C1EE 27 0E BEO WARMST
136 C1F0 E6 FF C106 TALK2 LDX #ACIAC
137 C1F4 C5 02 BITB
138 C1F6 27 F8 BEO TALK2 TX TO REMOTE BUSY
139 C1F8 A7 FF C10B STA [ACIAD] SEND CHR TO REMOTE
140 C1FC 20 04 BRA TALK
141
142 * PUNCH DATA LOCK TO REMOTE
143 C1FE 8E C294 PUNCH LDX #51
144 C201 8D 73 BSR POATA1
145 C203 86 10C LDX BITCNT
146 C206 8B 03 ADDA #3
147 C208 1F 09 TFR A,B FOR BC-ADDR
148 C20A 8D 25 BSR OUT2H SAVE
149 C20C 8E C1DA LDX STRADR BYTE COUNT
150 C20F 8D 18 BSR OUT4H START ADDR
151 C211 FB C1DA ADDB STRADR
152 C214 FB C10B STRADR+1 UPDATE CKSUM
153 C217 8D 87 BSR DUFMS GET BYTE
154 C219 14 02 PSHA
155 C21B E8 00 ADDB 0,S+
156 C21D 8D 12 BSR OUT2H
157 C21F 7A C10C DEC BYTCHM DECREASE BYTE CNT
158 C222 26 F3 BNE PUMJ2
159 C224 53 C0D0 TFR
160 C225 1F 98 BRA
161 C227 20 08 OUT2H OUT CKSUM

```

```

162 C229 34 10 OUT4H PSHX OUTPUT 4 HEX DIGITS IN "X"
163 C22B 35 02 PULA
164 C22D 80 02 BSR OUT2H
165 C22F 35 02 PULA
166 C231 34 02 OUT2H PSHA OUTPUT 2 HEX DIGITS IN "A"
167 C233 44 02 LSHA OUT HEX LEFT NIBBLE
168 C235 44 02 LSHA
169 C237 8D 02 BSR OUT4H
170 C239 44 02 P A
171 C23B 44 02 P A
172 C23D 8D 02 ANDA #SF OUT HEX RIGHT NIBBLE
173 C23F 35 02 ADDA #SJO
174 C241 84 0F OUT4H ANDA #SJO
175 C243 8B 30 CMPA #9 DIN TO ASC11
176 C245 81 39 BLE OUTCH
177 C247 2F 02 ADDA #7
178 C249 8B 07 OUTCH PSHA
179 C24B 34 02 OUTCH1 LDX #ACIAC
180 C24D A6 FF C106 BITA #1
181 C24F 85 01 BEO OUTCH2 NO CHAR RCVD
182 C251 27 08 LDX #ACIAD RCVD CHAR
183 C253 A6 FF C10B CMPA #7 ERROR RECEIVED?
184 C255 81 3F BNE OUTCH1 NO
185 C257 26 F8 STA ERFLG
186 C259 87 C10D OUTCH2 BITA #2
187 C25B 85 02 BEO OUTCH1 TX BUST
188 C25D 27 E9 PULA
189 C25F 35 02 STA [ACIAD] SEND CHR TO REMOTE
190 C261 A7 FF C10B RTS
191 C263 39
192
193 C265 BE C106 ACIA1 LDX ACIAC
194 C267 86 03 LDX #3 RESE1
195 C269 A7 00 STA 0,X
196 C26B 86 11 LDX #S11 8 BITS+2 STOP
197 C26D A7 80 STA 0,X+
198 C26F BF C10B SIX ACIAD
199 C271 39 RTS
200
201 * PRINT DATA STRING TO REMOTE
202 C273 8D CF PDATA BSR OUTCH
203 C275 A6 80 PDATA1 LDX 0,X+
204 C277 26 FA BNE PDATA
205 C279 39 RTS
206
207 C27B 0D 0A 54 52 HEAD FCC 50,5A,"TRANSFER SBUG FORMAT",50,5A,4
208 C27D 0D 0A 53 31 S1 FCC 50,5A,"S1",0
209 C27F 0D 0A 53 39 S9 FCC 50,5A,"S9",0
210 C281 AC AF 41 44 ERRMSG FCC "LOAD ERROR, LOCATION 5",4
211 C283 4E AF 20 54 MIXFR FCC "NO TRANSFER ADDRESS",4
212 C285 54 52 41 AE 1FRMSG FCC "TRANSFER ADDRESS IS 5",4
213 C287 49 4E 56 41 FILERR FCC "INVALID FILE SPECS ---"
214 C289 2D 54 41 4C PRMPT FCC "TALK MODE--S TO QUIT",50,5A,4
215
216 END START
0 ERROR(S) 1 WARNING(S)
LAST ADDRESS: C30F

```

## BIT BUCKET

Computer Systems Consultants  
E. M. Pass  
1454 Letta Lane, N. W.  
Conyers, GA 30207

Don Williams, Editor  
6B Micro Journal  
5900 Cassandra Smith  
PO Box 549  
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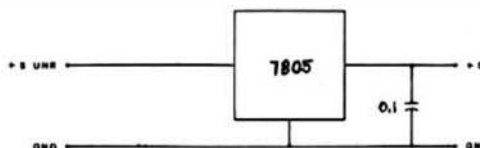
Dear Don:

Attached is a schematic providing a circuit for an interrupt timer. It could be used to replace a MP-T interval timer board for use with FLEX spooling logic. Its advantage is that it can be built for less than one dollar if based upon an old MP-C or MP-L SS-30 board with a PIA. Also, it could be built for less than ten dollars on a perforated board. The values suggested for the 555 oscillator resistors and capacitors will provide one interrupt approximately each millisecond. This will allow a very fast printer to be driven at full speed, as opposed to the standard MP-T interrupt interval of one per ten milliseconds. A 555 data sheet may be consulted if it is desired to change the interrupt interval.

Sincerely,

*E. M. Pass*  
E. M. Pass

Enclosure







Mr. Don Williams  
68 Micro Journal  
Box 649  
Nixson Tenn. 37343

I am sure that many of your readers will make good use of the enclosed program, because like as they have had the desire for a third drive but did not have sufficient need to make the investment. You can call this program a third drive eliminator.

Allowing you to remove the system disk, insert the disk containing "HOLD.TXT" in drive 0, and insert a blank disk in drive 1 to accept the assembled program. A "y" will assemble the file "HOLD.TXT" on drive 0 and create a command file on drive 1 named "HOLD.COM" without the assembler being present on either disk. A "N" may return to dos.

C840	BYGFCB	EDU	C840
CC19	LDRDF	EDU	CC19
CC10	XFRFB	EDU	CC10
CC1E	IFERAD	EDU	C 1E
CD03	MARKS	EDU	CD03
CD13	GET HR	EDU	CD13
CD18	PUTCNR	EDU	CD18
CD1E	PSTRNG	EDU	CD1E
CD20	GETF IL	EDU	CD20
CD30	LOAD	EDU	CD30
CD33	SETEXT	EDU	CD33
CD3F	RPTEAR	EDU	CD3F
CD24	PCRLF	EDU	CD24
D403	FMSCLB	EDU	D403
D406	FMS	EDU	D406

```

F507 20 20 20 49 MBD1 FCC 4 -- 'ILLEGAL FILE NAME'
F508 04 FCC 4
F509 20 20 20 4E MBD2 FCC 4 -- 'NO TRANSFER ADDRESS'
F512 04 FCC 4
F513 20 20 20 43 MBD3 FCC 4 -- 'CONTINUE Y / N ?'
F518 04 FCC 4
END HOLD

```

In my system I load this program at \$F300, a spot that no other programs use. An absolute must is that this program be loaded in a location where the program being held does not load on top of it. A good location would be address such as \$3000. I know of no programs that load in this area, also once a "Y" is given "HOLD" can be overwritten (destroyed) as it is no longer required.

Don, I'm told that you don't pay for published articles perhaps you will think enough of this superb program to start at the very least extend my subscription for life. After all I just eliminated the need for a third drive, freeing up any dollars that can be spent with your other advertisers, creating the need for more ad space.

Very Truly Yours  
*Rich Scappellato*  
 Rich Scappellato

PS. Remember "H/H" "H"

# **OmegaSoft Industrial Products Group** P.O. Box 70265 Sunnyvale, CA 94086

## **PASCAL COMPILER SYSTEM FOR 6809**

OmegaSoft is releasing a native code compiler to run under the following operating systems: MDOS, XDOS, FLEX, DOS49, or OS-9. The compact single-pass compiler quickly translates Pascal into optimized 6809 assembly language code without the necessity of time wasting disk swapping and multiple passes.

Nearly all of the proposed ISO standard is supported along with many extensions to make Pascal suitable for industrial and business users. Byte arithmetic has been added to allow simple control of eight bit I/O devices. Long integers will be supported to allow representation of money amounts without the speed penalties of double precision real or BCD implementations. Our 7 digit real format is compatible with the AM9511 APU and options are available to use this chip instead of the software routines.

The assembly language output of the compiler can be used with our interactive symbolic debugger allowing the user to quickly execute his program. Debugger commands also allow displaying and changing variables using their Pascal names, tracing through statements, and setting breakpoints at the start of Pascal

To produce a relocatable and ROMable module the output of the compiler can be run through any Motorola compatible relocatable assembler and linking loader (standard with many computers or available from OmegaSoft). This allows easy linking to assembly language routines and automatically trims out any runtime routines not needed for execution. This results in a significant savings in code size thereby less memory cost to the user.

Full dynamic variable allocation is provided via the NEW, DISPOSE, MARK, and RELEASE procedures. Random access files are supported on operating systems that adequately support this feature. Extensions are provided to allow linking assembly language routines with the Pascal and passing of variable addresses, either absolute or stacked. Custom I/O is easily handled by defining your own device drivers or using custom drivers for the standard Pascal I/O devices.

A 49k system is required to run the compiler on any of the operating systems. Included with the compiler are the symbolic debugger, runtime library with source, and utilities to assist in creating a "CHAIN" file for automatically linking the user program with the runtime library. A detailed language reference handbook is provided along with a configuration manual describing any operating system dependant features. The compiler package is available for \$425. A relocatable assembler and linker are also available for \$75 if required.

MDOS and XDOS are trademarks of Motorola. DOS49 is a trademark of Beoko Signal Broadcasting, OS-9 is a trademark of Microware, FLEX is a trademark of TSC.

## **WRITE 'N SPELL (tm)**

### **NEW PRODUCT ANNOUNCEMENT**

We are pleased to announce WRITE 'N SPELL, a companion program to our SPELL 'N FIX (formerly called MAGIC SPELL) spelling correction program. WRITE 'N SPELL helps you to spell words right the first time, before you have to resort to SPELL 'N FIX to fix them.

WRITE 'N SPELL is a dictionary lookup program which is used with your text editor. As you write your text, each time you come to a word whose spelling you are unsure of, you invoke WRITE 'N SPELL by typing a control character. WRITE 'N SPELL then allows you to search through its dictionary to check on the correct spelling. Within a few seconds you're back in your editor, sure that your word is spelled right. The first time.

WRITE 'N SPELL is available now for 4800 and 6809 systems using Technical Systems Consultants' Text Editor and Flex. Other versions, including BBC and Scroditor III versions as well as OS-9 and Color Computer versions, will be available soon. A disk system with a minimum of two drives and at least 40K of RAM is required.

WRITE 'N SPELL is priced at \$75.11 with the same 10,000+ word dictionary that is supplied with SPELL 'N FIX. SPELL 'N FIX owners who already have the dictionary can get WRITE 'N SPELL for \$60.75. An optional super dictionary of 75,000 words is available for \$150 additional; this option requires disk storage of at least 250K bytes per drive.

To introduce this unique and powerful program, orders placed before June 10th, 1982 will receive a special discount of \$15. If you order both WRITE 'N SPELL and SPELL 'N FIX at the same time, you may take a \$30 discount on the entire package.

928 Middle St.  
Bath, ME 04530

Don Williams  
C/O 68 Micro Journal  
6131 Airways Blvd.  
Chattanooga, TN 37421

Dear Don,

Hi! First, as always, congratulations for publishing what is, in my opinion, THE microcomputing magazine. Unlike the others, this one is tailored for the complete hobbyist, in that it has BOTH programs and hardware content.

Now, on to bliss and better things. It was only recently that I expanded my system to 48K. And I did it with the Digital Research 16K board. I assembled it in about 3 hours, and it has worked perfectly ever since. The only modification that I made was sticking a DIP switch into the jumper socket. (It makes re-addressing a whole lot easier). Congratulations to Digital Research too!

But, this isn't just a compliments letter. I have a couple of programs that I thought someone might want to use. It is yet ANOTHER checkbook management program, but it uses Random disk sections, and will store upwards of 1500 checks on one side of a single sided 35 track diskette. The programs are pretty simple, using "INSTR" commands instead of the old string search loop using "MID\$".

Basically (arrgh!!), what I did was store 5 sections of 50-byte info strings into one sector on the diskette. Each 50-byte section contains the Date, Payee, Item, Check, and Amount. That's usually enough for me. The way it's set up, you can type anything in to find anything. For example, if I wanted to find a payee named "WELLWOOD", I'd type in "WELL", and every payee name with "WELL" in it would come up. It makes it easy to find a payee, especially if you forget how to spell the name. Anything close gets you there.

Anyhow, it's just a little ditty that I put in the system. Hope that any others can use it (provided you print it!).

By the way, change my address from the "19 Footfalls" one to the one at the top of the page for me, will ya? Thanks much!!  
Once again, thanks for '68 micro'!!!

Calculationaly yours,

*Burt Jatz*  
Burt Jatz

```

10 POKE HEX$(ACB9),0:POKE HEX$(AEC1),255
20 GOSUB 450
30 PRINT TAB(20);"CHECKBOOK ACCOUNT PROGRAM"
40 PRINT:PRINT
50 PRINT TAB(10);"AVAILABLE OPTIONS:"
60 PRINT
70 PRINT" P = ENTER A PURPOSE"
80 PRINT" C = CHANGE INFORMATION"
90 PRINT" S = FIND ENTRIES"
100 PRINT" A = LIST ALL ENTRIES"
110 PRINT" B = CALCULATE ACCOUNT BALANCE"
120 PRINT" E = END PROGRAM"
130 PRINT
140 INPUT"WHICH OPTION DO YOU WISH?:"M
150 ON M GOTO 10,11

```

```

160 IF D#="P" THEN 230
170 IF D#="C" THEN 250
180 IF D#="S" THEN 270
190 IF D#="R" THEN 290
200 IF D#="B" THEN 310
210 IF D#="E" THEN 330
220 GOTO 20
230 PRINT "YOU HAVE CHOSEN TO MAKE AN ENTRY IN THE FILE. ARE YOU SURE?"
240 GOTO 360
250 PRINT "YOU HAVE CHOSEN TO CHANGE INFORMATION IN THE FILE. ARE YOU SURE?"
260 GOTO 360
270 PRINT "YOU HAVE CHOSEN TO FIND INFORMATION IN THE FILE. ARE YOU SURE?"
280 GOTO 360
290 PRINT "YOU HAVE CHOSEN TO LIST ALL ENTRIES IN THE FILE. ARE YOU SURE?"
300 GOTO 360
310 PRINT "YOU HAVE CHOSEN TO CALCULATE YOUR ACCOUNT BALANCE. ARE YOU SURE?"
320 GOTO 360
330 PRINT "YOU HAVE CHOSEN TO END THIS PROGRAM. ARE YOU SURE YOU HAVE?"
340 INPUT "COMPLETED ALL THE WORK YOU WANTED TO DO? Y/N"
350 GOTO 370
360 INPUT "YOU WANT TO USE THIS SEQUENCE? Y/N"
370 IF LEFT$(V$,1)="Y" THEN 320
380 GOTO 20
390 IF D#="P" THEN CHAIN "CENTER"
400 IF D#="C" THEN CHAIN "CHANGE"
410 IF D#="S" THEN CHAIN "SEARCH"
420 IF D#="R" THEN CHAIN "LIST"
430 IF D#="B" THEN CHAIN "BALANCE"
440 IF D#="E" THEN PRINT "CHECK ACCOUNT NUMBER AGAIN. (20) END"
450 FOR I=1 TO 24:PRINTNEXT I:PRINT CHR$(21):RETURN
460 RETURN

c:bank.dat
10 DIM G$(5)
20 OPEN "CHECKFILE" AS I
30 FIELD #I,50 AS G$(1),50 AS G$(2),50 AS G$(3),50 AS G$(4),50 AS G$(5)
40 DF=200
50 FOR I=1 TO 10
60 GET #I,RECORD I
70 FOR J=1 TO 5
80 IF MISC$(G$(J),0,1)="" THEN 110
90 NEXT J
100 NEXT I
110 IF I=0 THEN 110
120 PRINT "ENTER DATE AS DD MM YY"
130 INPUT "ENTER DATE AS DD MM YY"
140 IF D#="DATE" THEN CHAIN "CHECKBOOK"
150 IF LEFT$(D,1)="" THEN 110
160 IF LEFT$(D,1)="" THEN 110
170 INPUT "ENTER PRICE"
180 D#="PRICE"
190 INPUT "ENTER PURPOSE"
200 C#="PURPOSE"
210 INPUT "ENTER CHECK NUMBER"
220 D#="CHECK"
230 INPUT "ENTER AMOUNT"
240 C#="AMOUNT"
250 PRINT "ENTER DATE"
260 PRINT "ENTER DATE"
270 PRINT "ENTER DATE"
280 PRINT "ENTER DATE"
290 PRINT "ENTER DATE"
300 PRINT "ENTER DATE"
310 INPUT "THIS IS CORRECT? Y/N"
320 IF LEFT$(D,1)="" THEN 110
330 IF LEFT$(D,1)="" THEN 110
340 LSET G$(J)=D
350 PUT #I,RECORD I
360 GOTO 50

c:bank.dat
10 DIM G$(5)
20 OPEN "CHECKFILE" AS I
30 DF=200
40 FIELD #I,50 AS G$(1),50 AS G$(2),50 AS G$(3),50 AS G$(4),50 AS G$(5)
50 GOSUB 800
60 MISC$(G$(J),0,1)=""
70 PRINT TAB(10);"AVAILABLE SEARCH OPTIONS:"
80 PRINT:PRINT
90 PRINT "1 = DATE"
100 PRINT "2 = PRICE"
110 PRINT "3 = ITEM"
120 PRINT "4 = CHECK NUMBER"
130 PRINT:PRINT
140 INPUT "HOW DO YOU WISH TO FIND YOUR ITEM(S)? Y/N"
150 IF I=0 THEN CLOSE I:CHAIN "CHECKBOOK"
160 IF I=0 THEN 110
170 GOTO 50
180 INPUT "INPUT DATE AS DD MM YY"
190 INPUT "INPUT PRICE"
200 INPUT "INPUT ITEM"
210 INPUT "INPUT CHECK"
220 INPUT "INPUT AMOUNT"
230 FOR I=1 TO 10
240 GET #I,RECORD I
250 FOR J=1 TO 5
260 IF MISC$(G$(J),0,1)="" THEN 110
270 NEXT J
280 NEXT I
290 IF I=0 THEN 110
300 IF I=0 THEN 110
310 IF I=0 THEN 110
320 IF I=0 THEN 110
330 IF I=0 THEN 110
340 IF I=0 THEN 110
350 IF I=0 THEN 110
360 IF I=0 THEN 110
370 IF I=0 THEN 110
380 IF I=0 THEN 110
390 IF I=0 THEN 110
400 IF I=0 THEN 110
410 IF I=0 THEN 110
420 IF I=0 THEN 110
430 IF I=0 THEN 110
440 IF I=0 THEN 110
450 IF I=0 THEN 110
460 IF I=0 THEN 110
470 IF I=0 THEN 110
480 IF I=0 THEN 110
490 IF I=0 THEN 110
500 IF I=0 THEN 110
510 IF I=0 THEN 110
520 IF I=0 THEN 110
530 IF I=0 THEN 110
540 IF I=0 THEN 110
550 IF I=0 THEN 110
560 IF I=0 THEN 110
570 IF I=0 THEN 110
580 IF I=0 THEN 110
590 IF I=0 THEN 110
600 IF I=0 THEN 110
610 IF I=0 THEN 110
620 IF I=0 THEN 110
630 IF I=0 THEN 110
640 IF I=0 THEN 110
650 IF I=0 THEN 110
660 IF I=0 THEN 110
670 IF I=0 THEN 110
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750 IF I=0 THEN 110
760 IF I=0 THEN 110
770 IF I=0 THEN 110
780 IF I=0 THEN 110
790 IF I=0 THEN 110
800 IF I=0 THEN 110
810 IF I=0 THEN 110
820 IF I=0 THEN 110
830 IF I=0 THEN 110
840 IF I=0 THEN 110
850 IF I=0 THEN 110
860 IF I=0 THEN 110
870 IF I=0 THEN 110
880 IF I=0 THEN 110
890 IF I=0 THEN 110
900 IF I=0 THEN 110
910 IF I=0 THEN 110
920 IF I=0 THEN 110
930 IF I=0 THEN 110
940 IF I=0 THEN 110
950 IF I=0 THEN 110
960 IF I=0 THEN 110
970 IF I=0 THEN 110
980 IF I=0 THEN 110
990 IF I=0 THEN 110
1000 IF I=0 THEN 110

```

```

630 IF D#="P" THEN 610
640 PRINT "CHECK(21)"
650 GOTO 330
660 INPUT "NEW PRICE"
670 B#="PRICE"
680 B#="PRICE"
690 PRINT "CHECK(21)"
700 GOTO 330
710 INPUT "NEW PURPOSE"
720 C#="PURPOSE"
730 C#="PURPOSE"
740 PRINT "CHECK(21)"
750 GOTO 330
760 INPUT "NEW CHECK NUMBER"
770 D#="CHECK"
780 D#="CHECK"
790 PRINT "CHECK(21)"
800 GOTO 330
810 INPUT "NEW AMOUNT"
820 E#="AMOUNT"
830 E#="AMOUNT"
840 PRINT "CHECK(21)"
850 GOTO 330
860 IF I=0 THEN 110
870 NEXT I
880 FOR I=1 TO 24:PRINTNEXT I:PRINT CHR$(21):RETURN
890 PRINT "THIS DISK HAS NOW BEEN COMPLETELY SEARCHED."
900 INPUT "TYPE ANY KEY AND HIT RETURN TO CONTINUE THIS PROGRAM"
910 GOTO 50

c:bank.dat
10 DIM G$(5)
20 OPEN "CHECKFILE" AS I
30 DF=200
40 FIELD #I,50 AS G$(1),50 AS G$(2),50 AS G$(3),50 AS G$(4),50 AS G$(5)
50 INPUT "DO YOU WISH THE ENTRIES TO GO TO THE PRINTER? Y/N"
60 IF LEFT$(V$,1)="" THEN 110
70 FOR I=1 TO 10
80 GET #I,RECORD I
90 FOR J=1 TO 5
100 IF MISC$(G$(J),0,1)="" THEN 110
110 NEXT J
120 NEXT I
130 IF I=0 THEN 110
140 IF I=0 THEN 110
150 IF I=0 THEN 110
160 IF I=0 THEN 110
170 IF I=0 THEN 110
180 IF I=0 THEN 110
190 IF I=0 THEN 110
200 IF I=0 THEN 110
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810 IF I=0 THEN 110
820 IF I=0 THEN 110
830 IF I=0 THEN 110
840 IF I=0 THEN 110
850 IF I=0 THEN 110
860 IF I=0 THEN 110
870 IF I=0 THEN 110
880 IF I=0 THEN 110
890 IF I=0 THEN 110
900 IF I=0 THEN 110
910 IF I=0 THEN 110
920 IF I=0 THEN 110
930 IF I=0 THEN 110
940 IF I=0 THEN 110
950 IF I=0 THEN 110
960 IF I=0 THEN 110
970 IF I=0 THEN 110
980 IF I=0 THEN 110
990 IF I=0 THEN 110
1000 IF I=0 THEN 110

```

```

240 INPUT "INPUT END DATE",ED:IF LEN(ED)<8 THEN 30
250 IF LEN(ED)=8 THEN ED=ED*EDS
260 D=VAL(LEFT$(ED,2)):M=VAL(MID$(ED,4,3))
270 GOSUB 760:ED=M
280 GOTO 330
290 INPUT "INPUT PAYEE",BB:GOTO 330
300 INPUT "INPUT ITEM",CC:GOTO 330
310 INPUT "INPUT CHECK NUMBER",DD:GOTO 330
320 INPUT "TOTAL COST",EE:GOTO 330
330 FOR I=1 TO DF
340 GET #1,RECORD I
350 X=0
360 FOR D=1 TO 5
370 IF MID$(RECORD,D,1)<>" " THEN X=X+1:GOTO 510
380 REMID$(RECORD,D,1,9)
390 D=MID$(RECORD,D,10,20)
400 C=MID$(RECORD,D,30,10)
410 D=MID$(RECORD,D,40,4)
420 E=MID$(RECORD,D,44,7)
430 ON H:GOTO 440,470,480,490,500
440 D=VAL(LEFT$(D,2)):M=VAL(MID$(D,4,3))
450 GOSUB 760:D=M
460 IF D=ED THEN D=0:GOTO 510 ELSE 330
470 IF INSTR(1,BB,DD)=0 THEN 310 ELSE 360
480 IF INSTR(1,CC,EE)=0 THEN 310 ELSE 360
490 IF INSTR(1,DD,EE)=0 THEN 310 ELSE 360
500 IF INSTR(1,EE,EE)=0 THEN 310 ELSE 360
510 NEXT D
520 X=X+1
530 IF X=DF THEN 1=0
540 NEXT I
550 GOTO 700
560 C=C+1:IF C>1 THEN 610
570 IF C=1 AND PP=0 THEN GOSUB 750
580 PRINT #1, TAB(2):"DATE":TAB(20):"PAYEE":TAB(41):"PURPOSE":
590 PRINT #1, TAB(54):"CHECK":TAB(68):"AMOUNT"
600 PRINT #1
610 PRINT #1, AS:TAB(14):BS:TAB(39):CS:TAB(54):BS:TAB(68):"I":TAB(81):"S"
620 D=VAL(ED):T=T+D:END=END+D
630 IF PP=0 AND C<20 THEN 510
640 IF PP=1 AND C=20 THEN PRINT #1,CHR$(12):C=0:GOTO 510
650 IF PP=1 AND C=20 THEN 510
660 INPUT "C)CONTINUE OR (T)ERMINATE: ",V
670 IF V="C" THEN C=C+1:GOSUB 750:GOTO 510
680 IF V="T" THEN 50
690 GOTO 660
700 PRINT #1
710 PRINT #1, TAB(20):"ENTRIES IN THE FILE FOR A TOTAL OF "
720 IF PP=1 THEN PRINT #1,CHR$(12)
730 IF PP=0 THEN INPUT "TYPE ANY KEY AND HIT RETURN TO CONTINUE: "
740 GOTO 50
750 FOR C=1 TO 24:PRINT NEXT C:PRINT CHR$(21):RETURN
760 DATA JAN,0,FEB,31,MAR,30,APR,30,MAY,31,JUN,30
770 DATA JUL,31,AUG,31,SEP,30,OCT,31,NOV,30,DEC,31
780 RESTORE 1:Z=0
790 READ Z,Z+1
800 IF M=Z THEN M=Z+1:RETURN
810 GOTO 750

```

```

10 PRINT "FILE CREATION PROGRAM."
20 PRINT
30 PRINT
40 DIM BS(3)
50 OPEN NEW "CHECKFILE" AS I
60 FIELD #1,50 AS Q(1),50 AS Q(2),50 AS Q(3),50 AS Q(4),50 AS Q(5)
70 FOR I=1 TO 5
80 Q(I)=0
90 NEXT I
100 DF=200: # OF RECORDS TO USE (initially 5 to 100 if at least 100 records are used)
110 FOR I=1 TO DF
120 PUT #1,RECORD I
130 PRINT I:
140 NEXT I
150 CLOSE I
160 PRINT
170 PRINT
180 PRINT "DONE WITH FILE CREATION."

```



February 12, 1982

Box 416, Harborside Road  
Northeast Harbor, Me. 04862  
Tel. 276-5350

Mr. Don Williams  
'68 Micro Journal  
5900 Cassandra Smith  
P.O. Box 849  
Hixson, TN 37343

Dear Don:

Enclosed please find listings and disks for a program that I wrote for the CT-82xx terminal. I never can remember the commands for changing any of the parameters of the terminal so I wrote an English language command interpreter called CRTSET. Please publish if you have room, the CT-82xx is a great terminal and I'd like to see more support for its special features.

Readers can receive complete sources, command and instructions by sending a FLEX9 formatted 8" disk to the above address with four dollars for handling. (Sorry, I don't have 5" drives.)

Also please let your readers know that Thomas Instrumentation is a fantastic supplier. I've been dealing with Tom Guyon for three years and let me just say that he's one of the most honest people you'll ever meet. I recommend him highly.

Yours truly,

*Dwight M. Lanpher*  
Dwight M. Lanpher

## CRTSET

The CRTSET utility command is provided so that the user may control the characteristics of the terminal. With this command several of the special features of a SWTPC CT-82xx terminal may be controlled with english commands instead of special keyboard sequences.

### DESCRIPTION

The general syntax of the CRTSET command is:

CRTSET[.<parameter>]

where parameter is one of the following commands:

HELP	display help message
INVERT	enable shift inversion
NOINVERT	disable shift inversion
FORMAT1	select CRT format 1
FORMAT2	select CRT format 11
GRAPHICS	select CRT graphics format
NUMERIC	select numeric keypad
CURSOR	select cursor keypad
BLINK	set blinking cursor
NOBLINK	set non-blinking cursor
BLOCK	set block cursor
UNDERLINE	set underline cursor
DISPLAY	enable cursor display
SUPPRESS	suppress cursor display
ESCAPE	set escape data mode
NOESCAPE	clear escape data mode
RZSET	programmable reset
NNNN	set baud rate

Only the capitalized portion of the command need be typed, but anything beyond that minimum is acceptable. Typing CRTSET with no argument or with a question mark will type the above help message. , ; ' " and spaces are supported as separators. Lowercase input is accepted. All terminal baud rates are accepted. Some examples follow:

```

+++CRTSET
+++CRTSET?
+++CRTSET=HELP
+++CRTSET UNDERL
+++CRTSET,300

```

The first three examples will display the help message. The fourth will set the cursor to an underline. The fifth will set the terminal speed to 300 baud. See your terminal manual for further information.

Note: some CT-82xx terminals do not support the numeric keypad feature.

```

*****
*
*          CRTSET
*
*  Terminal configuration command for CT-82xx
*  version: 1.0.0 FLEX9
*  date: 12 Feb 1982
*  copyright: (c) 1982 D.M. Lanpher
*
*****

```

#### \* ASCII constants

0000	00Y	00U	00T	end of text
000A	LY	00V	10A	line feed
000D	CB	00U	100	carriage return
000B	BP	00V	010	space

#### \* system constants

CC01	EL	00U	1CC01	right end of command line
------	----	-----	-------	---------------------------

#### \* system subroutines

CD01	VARMS	00U	1CD01	File format entry point
CD10	PUTCH	00U	1CD10	Put character
CD11	PUTSTR	00U	1CD11	Put string
CD16	PCRLT	00U	1CD16	Put carriage return, line feed
CD17	HTCNR	00U	1CD17	Get next buffer character

#### \* escape and control

C100	ORC	0C100	
C100 30	10	CRTSET	30A
C100 01	01	VERSION	TCB
C100 10 10 10 10	10	TCB	- 4.0 --- D.M. Lanpher

```

*****
*
*  store the input command in CROBUF and terminate with EOF
*  convert alpha's from lower to upper case for table match
*  check for FLEX end at line character
*  check for other termination characters
*  if a termination character is found without a command then
*  operator needs assistance, print the help message

```

C110 30	0D 05C9	START	LEAZ	CROBUF.PEN
C110 77	C17	CLR	FINST	set the first line flag
* if FIRST equals 0 then this is the first time through				

C110 30	CD17	STORE	JBB	HTCNR
C110 01	01	CNPA	00FF	is it an alphanumeric character
C110 10	01	OLE	STORES	skip if not
C110 04	01	AMPA	01010101	otherwise, convert to upper case



```

C130 05 C003 STOREJ CHPA XL in it a PLEX end of line character
C131 27 1E STOREJ REQ STOREJ test than done getting characters

C132 31 0D 0031 LEAV TMTBL.PCR point to terminator table
C133 41 44 STOREJ CHPA Y in it a terminator?
C134 27 26 BEO STOREJ test than done getting characters
C135 24 AD LDB Y not terminator value

C136 31 04 CHPO REGT end of table?
C137 26 F6 BNE STOREJ not then end of table with next terminator
C138 27 00 BTA Y not a terminator, state the character
C139 30 C0F1 JMC FIRST it's as long as the first time through
C140 30 00 BNE STOREJ do not continue
C141 30 00 TMTBL PCD CR in it a null/zero register?
C142 30 00 PCD Y in it a space?
C143 30 00 PCD Y in it a period?
C144 30 00 PCD Y in it a comma?
C145 30 00 PCD Y in it a colon?
C146 30 00 PCD Y in it a semicolon?
C147 30 00 PCD Y in it a question mark?
C148 30 00 PCD Y
C149 30 00 PCD Y
C150 30 00 PCD Y

```

```

C150 30 C0F1 STOREJ TBT FIRST in it the first time through?
C151 1027 BNE LDB HELP it is then user needs help
C152 06 00 LDB REGT determine store command terminator
C153 27 20 STA Y
C154 30 00 BNE CHDSEC now go to next

```

\*\*\*\*\*

\* command table

```

C155 09 0D 0009 CHDSEC LEAR CHDCTL.PCR set command table pointer
C156 31 0D 0303 CHDSEC LEAV CHDOUT.PCR set command buffer pointer
C157 06 44 CHDSEC LDB X set character flag table
C158 01 16 CHDSEC CHPA Y check for command terminator
C159 37 33 CHDSEC CHDGO (loop 11, now 00)
C160 06 00 LDB Y increment table pointer
C161 27 40 CHPA Y do they match?
C162 27 F4 BEO CHDSEC test next character

C163 24 00 CHDSEC LDB Y skip rest of this command
C164 01 16 CHPA Y in it a command terminator?
C165 26 F6 BNE CHDSEC skip until table end null is jump
C166 30 00 LEAV LDB Y skip rest jump address
C167 24 00 LDB Y check for end of table
C168 21 04 BNE CHDSEC go to next table entry

```

```

C169 05 0D 0305 LEAR CHDSEC.PCR set table, repeat 11
C170 17 00FF LDB PSTRNC
C171 30 40 0342 LEAV CHDOUT.PCR point to the character command
C172 17 0053 LDB PDAT11
C173 30 C033 JMC VARKS jump to FL33
C174 27 00 JMC JMC X's own table jump

```

\*\*\*\*\*

\* command table

```

C180 42 0C 01 CHDCTL PCC 'BLI' C181 16 0133 LDBA 0130
C182 16 0140 LDBA 0130
C183 16 0147 PCC 'HDB' LDBA 0130
C184 16 0150 LDBA 0130
C185 16 0157 PCC 'BLO' LDBA 0130
C186 16 0160 LDBA 0130
C187 16 0167 PCC 'WID' LDBA 0130
C188 16 0170 LDBA 0130
C189 16 0177 PCC 'INV' LDBA 0130
C190 16 0180 LDBA 0130
C191 16 0187 PCC 'NOI' LDBA 0130
C192 16 0190 LDBA 0130
C193 16 0197 PCC 'ESC' LDBA 0130
C194 16 0200 LDBA 0130
C195 16 0207 PCC 'HDB' LDBA 0130
C196 16 0210 LDBA 0130
C197 16 0217 PCC 'HDB' LDBA 0130
C198 16 0220 LDBA 0130
C199 16 0227 PCC 'HDB' LDBA 0130
C200 16 0230 LDBA 0130
C201 16 0237 PCC 'HDB' LDBA 0130
C202 16 0240 LDBA 0130
C203 16 0247 PCC 'HDB' LDBA 0130
C204 16 0250 LDBA 0130
C205 16 0257 PCC 'HDB' LDBA 0130
C206 16 0260 LDBA 0130
C207 16 0267 PCC 'HDB' LDBA 0130
C208 16 0270 LDBA 0130
C209 16 0277 PCC 'HDB' LDBA 0130
C210 16 0280 LDBA 0130
C211 16 0287 PCC 'HDB' LDBA 0130
C212 16 0290 LDBA 0130
C213 16 0297 PCC 'HDB' LDBA 0130
C214 16 0300 LDBA 0130
C215 16 0307 PCC 'HDB' LDBA 0130
C216 16 0310 LDBA 0130
C217 16 0317 PCC 'HDB' LDBA 0130
C218 16 0320 LDBA 0130
C219 16 0327 PCC 'HDB' LDBA 0130
C220 16 0330 LDBA 0130
C221 16 0337 PCC 'HDB' LDBA 0130
C222 16 0340 LDBA 0130
C223 16 0347 PCC 'HDB' LDBA 0130
C224 16 0350 LDBA 0130
C225 16 0357 PCC 'HDB' LDBA 0130
C226 16 0360 LDBA 0130
C227 16 0367 PCC 'HDB' LDBA 0130
C228 16 0370 LDBA 0130
C229 16 0377 PCC 'HDB' LDBA 0130
C230 16 0380 LDBA 0130
C231 16 0387 PCC 'HDB' LDBA 0130
C232 16 0390 LDBA 0130
C233 16 0397 PCC 'HDB' LDBA 0130
C234 16 0400 LDBA 0130
C235 16 0407 PCC 'HDB' LDBA 0130
C236 16 0410 LDBA 0130
C237 16 0417 PCC 'HDB' LDBA 0130
C238 16 0420 LDBA 0130
C239 16 0427 PCC 'HDB' LDBA 0130
C240 16 0430 LDBA 0130
C241 16 0437 PCC 'HDB' LDBA 0130
C242 16 0440 LDBA 0130
C243 16 0447 PCC 'HDB' LDBA 0130
C244 16 0450 LDBA 0130
C245 16 0457 PCC 'HDB' LDBA 0130
C246 16 0460 LDBA 0130
C247 16 0467 PCC 'HDB' LDBA 0130
C248 16 0470 LDBA 0130
C249 16 0477 PCC 'HDB' LDBA 0130
C250 16 0480 LDBA 0130
C251 16 0487 PCC 'HDB' LDBA 0130
C252 16 0490 LDBA 0130
C253 16 0497 PCC 'HDB' LDBA 0130
C254 16 0500 LDBA 0130
C255 16 0507 PCC 'HDB' LDBA 0130
C256 16 0510 LDBA 0130
C257 16 0517 PCC 'HDB' LDBA 0130
C258 16 0520 LDBA 0130
C259 16 0527 PCC 'HDB' LDBA 0130
C260 16 0530 LDBA 0130
C261 16 0537 PCC 'HDB' LDBA 0130
C262 16 0540 LDBA 0130
C263 16 0547 PCC 'HDB' LDBA 0130
C264 16 0550 LDBA 0130
C265 16 0557 PCC 'HDB' LDBA 0130
C266 16 0560 LDBA 0130
C267 16 0567 PCC 'HDB' LDBA 0130
C268 16 0570 LDBA 0130
C269 16 0577 PCC 'HDB' LDBA 0130
C270 16 0580 LDBA 0130
C271 16 0587 PCC 'HDB' LDBA 0130
C272 16 0590 LDBA 0130
C273 16 0597 PCC 'HDB' LDBA 0130
C274 16 0600 LDBA 0130
C275 16 0607 PCC 'HDB' LDBA 0130
C276 16 0610 LDBA 0130
C277 16 0617 PCC 'HDB' LDBA 0130
C278 16 0620 LDBA 0130
C279 16 0627 PCC 'HDB' LDBA 0130
C280 16 0630 LDBA 0130
C281 16 0637 PCC 'HDB' LDBA 0130
C282 16 0640 LDBA 0130
C283 16 0647 PCC 'HDB' LDBA 0130
C284 16 0650 LDBA 0130
C285 16 0657 PCC 'HDB' LDBA 0130
C286 16 0660 LDBA 0130
C287 16 0667 PCC 'HDB' LDBA 0130
C288 16 0670 LDBA 0130
C289 16 0677 PCC 'HDB' LDBA 0130
C290 16 0680 LDBA 0130
C291 16 0687 PCC 'HDB' LDBA 0130
C292 16 0690 LDBA 0130
C293 16 0697 PCC 'HDB' LDBA 0130
C294 16 0700 LDBA 0130
C295 16 0707 PCC 'HDB' LDBA 0130
C296 16 0710 LDBA 0130
C297 16 0717 PCC 'HDB' LDBA 0130
C298 16 0720 LDBA 0130
C299 16 0727 PCC 'HDB' LDBA 0130
C300 16 0730 LDBA 0130
C301 16 0737 PCC 'HDB' LDBA 0130
C302 16 0740 LDBA 0130
C303 16 0747 PCC 'HDB' LDBA 0130
C304 16 0750 LDBA 0130
C305 16 0757 PCC 'HDB' LDBA 0130
C306 16 0760 LDBA 0130
C307 16 0767 PCC 'HDB' LDBA 0130
C308 16 0770 LDBA 0130
C309 16 0777 PCC 'HDB' LDBA 0130
C310 16 0780 LDBA 0130
C311 16 0787 PCC 'HDB' LDBA 0130
C312 16 0790 LDBA 0130
C313 16 0797 PCC 'HDB' LDBA 0130
C314 16 0800 LDBA 0130
C315 16 0807 PCC 'HDB' LDBA 0130
C316 16 0810 LDBA 0130
C317 16 0817 PCC 'HDB' LDBA 0130
C318 16 0820 LDBA 0130
C319 16 0827 PCC 'HDB' LDBA 0130
C320 16 0830 LDBA 0130
C321 16 0837 PCC 'HDB' LDBA 0130
C322 16 0840 LDBA 0130
C323 16 0847 PCC 'HDB' LDBA 0130
C324 16 0850 LDBA 0130
C325 16 0857 PCC 'HDB' LDBA 0130
C326 16 0860 LDBA 0130
C327 16 0867 PCC 'HDB' LDBA 0130
C328 16 0870 LDBA 0130
C329 16 0877 PCC 'HDB' LDBA 0130
C330 16 0880 LDBA 0130
C331 16 0887 PCC 'HDB' LDBA 0130
C332 16 0890 LDBA 0130
C333 16 0897 PCC 'HDB' LDBA 0130
C334 16 0900 LDBA 0130
C335 16 0907 PCC 'HDB' LDBA 0130
C336 16 0910 LDBA 0130
C337 16 0917 PCC 'HDB' LDBA 0130
C338 16 0920 LDBA 0130
C339 16 0927 PCC 'HDB' LDBA 0130
C340 16 0930 LDBA 0130
C341 16 0937 PCC 'HDB' LDBA 0130
C342 16 0940 LDBA 0130
C343 16 0947 PCC 'HDB' LDBA 0130
C344 16 0950 LDBA 0130
C345 16 0957 PCC 'HDB' LDBA 0130
C346 16 0960 LDBA 0130
C347 16 0967 PCC 'HDB' LDBA 0130
C348 16 0970 LDBA 0130
C349 16 0977 PCC 'HDB' LDBA 0130
C350 16 0980 LDBA 0130
C351 16 0987 PCC 'HDB' LDBA 0130
C352 16 0990 LDBA 0130
C353 16 0997 PCC 'HDB' LDBA 0130
C354 16 1000 LDBA 0130
C355 16 1007 PCC 'HDB' LDBA 0130
C356 16 1010 LDBA 0130
C357 16 1017 PCC 'HDB' LDBA 0130
C358 16 1020 LDBA 0130
C359 16 1027 PCC 'HDB' LDBA 0130
C360 16 1030 LDBA 0130
C361 16 1037 PCC 'HDB' LDBA 0130
C362 16 1040 LDBA 0130
C363 16 1047 PCC 'HDB' LDBA 0130
C364 16 1050 LDBA 0130
C365 16 1057 PCC 'HDB' LDBA 0130
C366 16 1060 LDBA 0130
C367 16 1067 PCC 'HDB' LDBA 0130
C368 16 1070 LDBA 0130
C369 16 1077 PCC 'HDB' LDBA 0130
C370 16 1080 LDBA 0130
C371 16 1087 PCC 'HDB' LDBA 0130
C372 16 1090 LDBA 0130
C373 16 1097 PCC 'HDB' LDBA 0130
C374 16 1100 LDBA 0130
C375 16 1107 PCC 'HDB' LDBA 0130
C376 16 1110 LDBA 0130
C377 16 1117 PCC 'HDB' LDBA 0130
C378 16 1120 LDBA 0130
C379 16 1127 PCC 'HDB' LDBA 0130
C380 16 1130 LDBA 0130
C381 16 1137 PCC 'HDB' LDBA 0130
C382 16 1140 LDBA 0130
C383 16 1147 PCC 'HDB' LDBA 0130
C384 16 1150 LDBA 0130
C385 16 1157 PCC 'HDB' LDBA 0130
C386 16 1160 LDBA 0130
C387 16 1167 PCC 'HDB' LDBA 0130
C388 16 1170 LDBA 0130
C389 16 1177 PCC 'HDB' LDBA 0130
C390 16 1180 LDBA 0130
C391 16 1187 PCC 'HDB' LDBA 0130
C392 16 1190 LDBA 0130
C393 16 1197 PCC 'HDB' LDBA 0130
C394 16 1200 LDBA 0130
C395 16 1207 PCC 'HDB' LDBA 0130
C396 16 1210 LDBA 0130
C397 16 1217 PCC 'HDB' LDBA 0130
C398 16 1220 LDBA 0130
C399 16 1227 PCC 'HDB' LDBA 0130
C400 16 1230 LDBA 0130
C401 16 1237 PCC 'HDB' LDBA 0130
C402 16 1240 LDBA 0130
C403 16 1247 PCC 'HDB' LDBA 0130
C404 16 1250 LDBA 0130
C405 16 1257 PCC 'HDB' LDBA 0130
C406 16 1260 LDBA 0130
C407 16 1267 PCC 'HDB' LDBA 0130
C408 16 1270 LDBA 0130
C409 16 1277 PCC 'HDB' LDBA 0130
C410 16 1280 LDBA 0130
C411 16 1287 PCC 'HDB' LDBA 0130
C412 16 1290 LDBA 0130
C413 16 1297 PCC 'HDB' LDBA 0130
C414 16 1300 LDBA 0130
C415 16 1307 PCC 'HDB' LDBA 0130
C416 16 1310 LDBA 0130
C417 16 1317 PCC 'HDB' LDBA 0130
C418 16 1320 LDBA 0130
C419 16 1327 PCC 'HDB' LDBA 0130
C420 16 1330 LDBA 0130
C421 16 1337 PCC 'HDB' LDBA 0130
C422 16 1340 LDBA 0130
C423 16 1347 PCC 'HDB' LDBA 0130
C424 16 1350 LDBA 0130
C425 16 1357 PCC 'HDB' LDBA 0130
C426 16 1360 LDBA 0130
C427 16 1367 PCC 'HDB' LDBA 0130
C428 16 1370 LDBA 0130
C429 16 1377 PCC 'HDB' LDBA 0130
C430 16 1380 LDBA 0130
C431 16 1387 PCC 'HDB' LDBA 0130
C432 16 1390 LDBA 0130
C433 16 1397 PCC 'HDB' LDBA 0130
C434 16 1400 LDBA 0130
C435 16 1407 PCC 'HDB' LDBA 0130
C436 16 1410 LDBA 0130
C437 16 1417 PCC 'HDB' LDBA 0130
C438 16 1420 LDBA 0130
C439 16 1427 PCC 'HDB' LDBA 0130
C440 16 1430 LDBA 0130
C441 16 1437 PCC 'HDB' LDBA 0130
C442 16 1440 LDBA 0130
C443 16 1447 PCC 'HDB' LDBA 0130
C444 16 1450 LDBA 0130
C445 16 1457 PCC 'HDB' LDBA 0130
C446 16 1460 LDBA 0130
C447 16 1467 PCC 'HDB' LDBA 0130
C448 16 1470 LDBA 0130
C449 16 1477 PCC 'HDB' LDBA 0130
C450 16 1480 LDBA 0130
C451 16 1487 PCC 'HDB' LDBA 0130
C452 16 1490 LDBA 0130
C453 16 1497 PCC 'HDB' LDBA 0130
C454 16 1500 LDBA 0130
C455 16 1507 PCC 'HDB' LDBA 0130
C456 16 1510 LDBA 0130
C457 16 1517 PCC 'HDB' LDBA 0130
C458 16 1520 LDBA 0130
C459 16 1527 PCC 'HDB' LDBA 0130
C460 16 1530 LDBA 0130
C461 16 1537 PCC 'HDB' LDBA 0130
C462 16 1540 LDBA 0130
C463 16 1547 PCC 'HDB' LDBA 0130
C464 16 1550 LDBA 0130
C465 16 1557 PCC 'HDB' LDBA 0130
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C639 16 2427 PCC 'HDB' LDBA 0130
C640 16 2430 LDBA 0130
C641 16 2437 PCC 'HDB' LDBA 0130
C642 16 244
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**68** XX  
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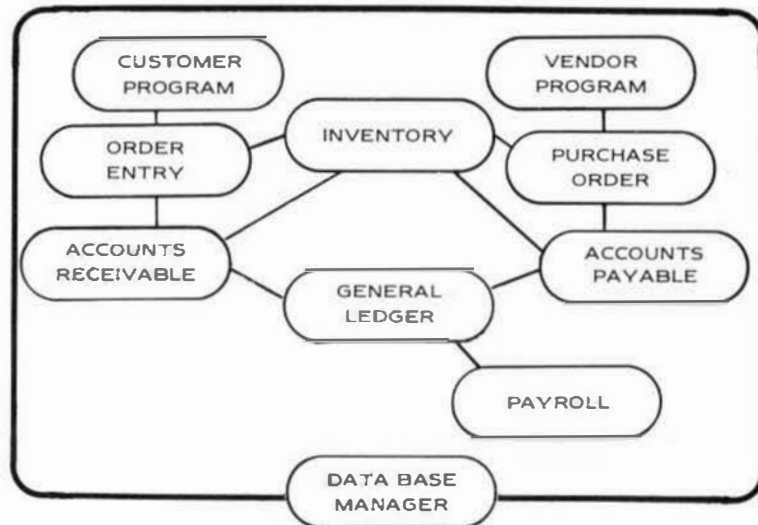
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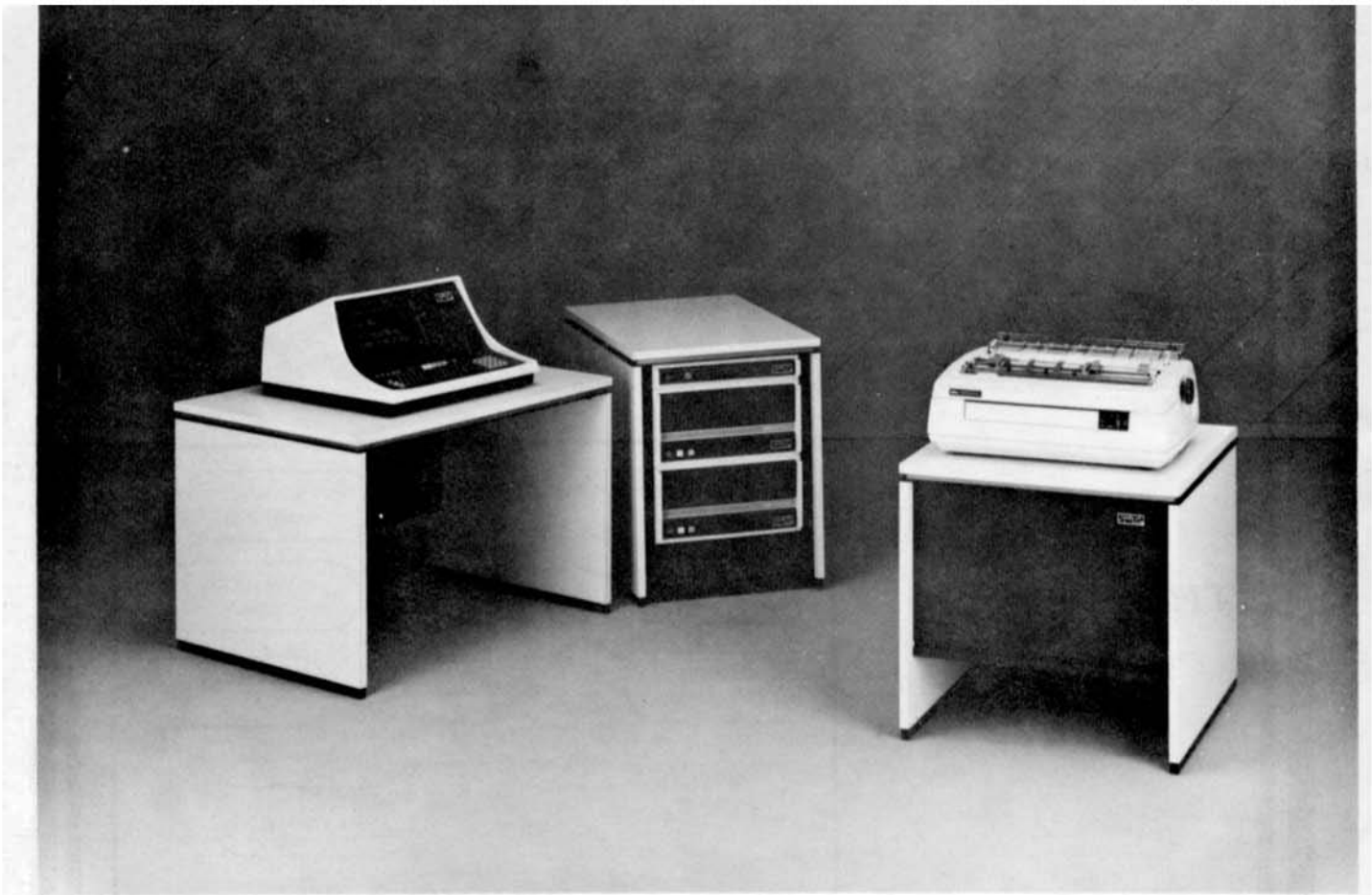
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 RAM Associates 49 Overlook Dr. Framingham, Mass. 01701  
 MRLectronics B.V. Buitendofdreef 280 2625 Re delft. The Netherlands  
 New Technology Systems P.O. Box 2 Canatlan, DGO Mexico  
 Paris Radio 7 A Burton St. Darlinghurst, NSW Australia  
 Downeast Data Box 416 Harborside Rd. Northeast Harbor, Me. 04662  
 SWTP 38 Dover St. London, England

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**UNIVERSAL  
DATA  
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INC.**



# THE COMPLETE BUSINESS SYSTEM

## + Multiuser + Highly Expandable + Cost Effective

### S+ THE CONCEPT

The S+ system is a modular computer system in which all portions of the hardware and software are designed to work together in the most efficient way possible. An S+ single user system with floppy disk storage is a competitive and cost effective entry level system. Unlike most other small computers being sold as "personal", or "small business" machines, the S+ system may be expanded to maximum capabilities using this same hardware and software. You cannot end up with a DEAD END system that cannot be expanded and whose software is not compatible with larger machines. A basic S+ system may be expanded to thirty-two users, a megabyte of main memory and hundreds of megabytes of hard disk storage by simply plugging in, or connecting the desired upgrade equipment.

### TOTAL DESIGN—Hardware and Software

The S+ system is an integrated hardware and software design. The two complement and enhance each other in this system. The UniFLEX® operating

system used in the S+ systems is patterned after the Bell Laboratories UNIX® operating system, one of the most admired and widely used operating systems in the world. Instead of being an afterthought, the software is part of the design of the S+ system. You can be sure that with this approach that all parts of the computer operate with maximum efficiency and cost effectiveness.

### THE CENTRAL PROCESSOR

The basic S+ system is configured with 256K bytes of memory and can be expanded to more than 1 million bytes. An efficient and fast hardware memory management system is used to allocate the available memory among the users on a dynamic basis. As little as 8K bytes, or the entire memory—if needed—can be used by any individual user. This makes it possible to run very large programs on the system, but it also uses no more memory than necessary for a particular job. The increase in cost effectiveness of this system over crude and outdated bank switching arrangements is dramatic.



The central processor runs in both user and supervisor states. It can detect and reject a defective user program. It is impossible for a user program to go bad and stop the entire system, as can happen quite easily in less sophisticated systems.

Task switching is accomplished by use of a multiple map RAM memory, with sixty-four individual task maps. Each task can access from 4 to 64 K-bytes of memory. Multiple tasks may be used in programs that require more than 64K bytes of memory for execution. When a task is completed the memory is automatically released for other use.

### SOFTWARE

The S+ operating system, UniFLEX® is a multiuser, multitasking operating system based on the UNIX® operating system that has been used for many years on Digital Equipment Corp. PDP-11 series minicomputers. It is considered one of the most sophisticated and "user friendly" operating systems available. Variations of UNIX® are rapidly becoming standard on mini and larger microcomputers.

A large variety of languages are available for use with the system. These include FORTRAN, COBOL, BASIC, and Pascal. Word processing packages are also available to give you full text processing capability on the system.

Applications programs are available in large quantities in many fields. This includes general business, medical, dental, veterinary, library and real estate management; plus others. Since the system is multiuser it can also be connected to cash registers to produce a point-of-sale terminal system combined with the computer. The possibilities for application of this system are endless.

### THE I/O SYSTEM

The S+ system is totally interrupt driven. All terminal and printer I/O devices connect to an I/O bus separate from the main bus. Up to thirty-two separate devices may be connected to the I/O bus at any one time. If I/O activity is great enough to cause an unacceptable slowdown in system operation, a separate I/O processor can be installed in the system. This plug-in option removes all I/O handling

overhead from the main processor and allows operation of up to thirty-two external devices at 9,600 baud. Without an integrated total design, as in the S+ system, it would become impractical to use a UNIX® type operating system in a situation with heavy terminal I/O activity.

### DISK STORAGE

A wide range of disk storage capacity is available for the S+ system, from 2.5 M-byte floppy disks to an 80 M-byte Winchester and many sizes between. All disk controllers use direct memory access (DMA) type operations to maximize data transfer and to minimize overhead on the main processor. The Winchester disks also use intelligent controllers along with DMA transfers to preserve the performance that these type devices are capable of giving. Without this distributed intelligence the system performance would be greatly degraded. The UniFLEX® operating system is designed to work at maximum efficiency with this type disk system. The data transfer rates achieved by this combination rival those of large minicomputers.

### COMMUNICATIONS

A high speed local network communications system is available to interconnect S+ systems. The VIA-BUS® network will allow communication between systems at data rates of over 400K baud. Such a system makes it possible to share data between local systems in an efficient and low-cost manner.

### AVAILABLE SOON

Tape backup—20M-Byte in less than 15 minutes on a standard ¼ inch cartridge.

Mini-Wini—5 and 10 M-Byte Winchesters—5¼ inch package. Winchester performance, for smaller systems in a small package. UniFLEX® compatible design.

Large Capacity—190 and 340 M-Byte Winchesters, plus SMD cartridge drives.

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*UNIX is a registered trademark of Bell Labs.*

*VIABUS is a registered trademark of Southwest Technical Products Corporation.*



SOUTHWEST TECHNICAL PRODUCTS CORPORATION  
219 W. RHAPSODY  
SAN ANTONIO, TEXAS 78216 (512) 344-0241

```

C391 00 0A      MIPMBC  FCB      CR.LF
C39A 43 38 34 39  FCB      'CHTBET can perform the following:'
C408 43 34 10 38  FCB      'CY-1234 commands:'
C41C 00 00      FCB      CR.LF
C43E 73 79 6E 74  FCB      'enter CHTBET command:'
C444 00 0A 0A  FCB      CR.LF
C449 49 4E 36 45  FCB      'INVERT      enable shift inversion'
C458 4E 47 45 4E  FCB      'MODINVERT    enable shift inversion'
C465 00 0A  FCB      CR.LF
C474 44 47 51 40  FCB      'FOURMATE    select CRT format 1'
C48C 44 47 52 40  FCB      'FOURMATE    select CRT format 2'
C49C 00 0A  FCB      CR.LF
C4B0 47 51 41 88  FCB      'CRASHISS    select CRT Graphics format'
C4B9 00 0A  FCB      CR.LF
C4C7 4E 35 3D 43  FCB      'NUMERIC     select numeric keypad'
C4D2 43 35 31 73  FCB      'CURSOR      select cursor capped'
C4E8 00 0A  FCB      CR.LF
C4F4 43 4C 41 4E  FCB      'BLINK       set blinking cursor'
C503 4E 47 43 4C  FCB      'MOBLINK     set non-blinking cursor'
C51A 00 0A  FCB      CR.LF
C52C 43 4C 47 43  FCB      'BLINK       set blink timer'
C53C 51 4E 44 43  FCB      'UNDERLINE   set underline cursor'
C541 00 0A  FCB      CR.LF
C549 43 4C 47 43  FCB      'DIBLANK     enable cursor display'
C55C 51 35 30 70  FCB      'SUPPRESS    suppress cursor display'
C56B 00 0A  FCB      CR.LF
C574 43 38 43 61  FCB      'SCROLL      set scroll data mode'
C58B 4E 47 45 73  FCB      'MODSCROLL   block scroll data mode'
C59A 00 0A  FCB      CR.LF
C5A7 32 43 33 43  FCB      'HISOR       programmable reset'
C5B4 00 0A  FCB      CR.LF
C5C4 4E 4X 4E 4Z  FCB      'ONRRN       set baud rate'
C5D1 00 0A  FCB      CR.LF
C5E7 00  FCB      SET

```

```

C6B8 43 47 4D 4D  NOTMBC  FCB      'COMMAND EROR: do not recognize'
C6DA 00  FCB      SET

```

```

*****
*
* Subroutines

```

```

C6D8 44 00  PDAT1:  LDA      .X
C6E1 01 00  CMA      460T
C6E8 01 00  RMC      PDAT1
C6F0 3F 00  RPS
C6F7 00 00  PDAT1:  JSR      PUTCHR
C703 38 00  DBA      PDAT1

```

```

*****
*
* Storage

```

```

C7E3          CHDRUF  BRR      13
C7F1          FIRST  RMB      1      first time this flag

                ZNO      CHTBET

```

#### SYMBOL TABLE

```

BLINA  E101  SLOC8  C20D  CHDRUF  C4E3  CHDR00  C18F  CHDR01  C1AC
CHDR01  C19C  CHDR01  C149  CHDR02  C191  CHDR03  C149  C8  8800
CMT1   C101  CRT2  C309  CHTBET  C188  CHDR04  C188  DISPTA  C41F
EL     C001  EOT  0000  ESCAPE  C3F3  FIRST  C471  GRAPH  C36D
ELF    C002  MIPMBC  C37A  INVERT  C1E7  LT  000A  MSC1  C1D8
MBC11  C3E4  MSC11  C3E4  MSC12  C3E5  MSC13  C3E6  MSC14  C3E7
MBC15  C3F4  MSC15  C3F4  MSC16  C3F5  MSC17  C3F6  MSC18  C3F7
MBC19  C380  MSC19  C380  MSC20  C381  MSC21  C382  MSC22  C383
MOBLIN  C407  MDESCA  C278  MODINVE  C1E7  MIPMBC  C488  NUMER1  C123
MUTCHR  C017  PCRLF  C018  PDAT1A  C4D9  PDAT1B  C4E0  PSTRNG  C01E
PUTCHR  C017  RESST  C319  R148  C31A  S1008  C328  R110  C356
R116  C39C  R1100  C394  S11000  C386  S1215  C391  S14008  C384
R116  C394  S1100  C386  S11200  C388  S1215  C391  S14008  C384
R23A08  C38C  R110  C34C  S1000  C388  S1100  C38C  S110  C378
R23A08  C384  S1100  C378  S11000  C384  S1100  C378  S1100  C37C
R118  C394  S1100  C380  S11  C398  S10  C39C  S100  C37C
R1008  C384  S1100  C388  S12  C398  S1100  C38C  SENDIT  C051
SETPD  C3C8  BP  8800  START  C118  STOR0  C117  STOR1  C118
STOR0  C133  STOR1  C118  SUPPRE  C317  T  MTR0  C113  UNDER  C113
VERS10  C102  VARNR  C0E3

```

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15 February 1982

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68 Micro Journal,  
5900 Cassandra Smith,  
Computer Publishing Center,  
P.O. Box 849,  
Hixson, TN 37343

Dear Don,

I have been a collector of programs for some years now, and although not a game-fan (I prefer working with machine-code) I do like to have a variety of games on hand for entertaining visitors. Until recently I had about 4 or 5 stock games which ran nicely, and then all of a sudden ... I got the urge to check out and update the rest of my library. To my horror, I discovered that 90% of my games either would not run at all or else ran so poorly that they didn't justify the disk space they took up. So I decided to house-clean, debugging those worthy of salvage, and dumping the rest. Would you believe:

1. A fairly good chess program, but the computer would castle (sometimes illegally) and not allow the player to castle at all?
2. A checkers program, where the computer would maintain one of its pieces on row 7 and from it produce King after King until the board became choked with Kings?
3. A Star Trek program where a single Phaser blast of any non-zero energy-level (no matter how small) would instantly destroy every Klingon in the Player's sector? Not that it really mattered, because after their initial blast of the Enterprise they would go down and just sit there waiting to be picked off.

As a result of this kind of thing, I began to develop techniques for testing out the various game conditions, and now find that I enjoy cleaning-up even ones enhancing these games, to the point where

it's become a hobby, and for me is far more enjoyable than actually playing the games themselves. But why keep them to myself, when I can share them with your game-hungry readers? So here goes with the first ... a listing of OTHELLO.

The games have been written to run under TSC's X-BASIC, and in general have also been modified to take advantage of the capabilities of the CIMIX 8002A Video Board. After all, it's much more dramatic to see a piece move or change colour right before your very eyes than to watch a new display scroll up on the screen! My next step will be to create a disk-library of game characters, such as chess pieces, using the powerful CIMIX "MASCALAS" software, to finally polish up the appearance of these games.

Maybe I should make "scrolling" versions of these games for those readers who do not have CIMIX Video Board compatible systems? What do you think? In any event, I would like to hear from you folks out there who have developed techniques or unusual applications for this board, or who would simply like to swap enhanced games with me.

*Bob Jones*  
R. T. Jones  
PRESIDENT

#### OTHELLO.MAS

```

100PRINT CHR$(24)
120 DIM A$(10,10),I$(9),J$(9),C$(9),D$(4)
125 PRINT CHR$(12)
130 PRINT TAB(16); "GREETINGS FROM OTHELLO."
140 IS=CHR$(12);JS=CHR$(13)
150 PRINT INPUT "Would you like instructions (Y or N)";QS
170 IF QS="Y" OR QS="N" GOTO 400
190 PRINT "OTHELLO is played on an 8 x 8 Checkers board, with rows numbered"
200 PRINT "1 to 8 and columns A to H. The initial configuration is all black."
220 PRINT "except for the centre four squares, which form the pattern:"
240 PRINT TAB(19);JS;" ";JS
250 PRINT TAB(19);JS;" ";IS:PRINT
280 PRINT "Try to place your piece on that it outflanks mine, creating a"
290 PRINT "horizontal, vertical or diagonal run of 3 pieces bounded at each"
300 PRINT "end by at least one of yours."
320 PRINT "NOTE: You must capture at least one of my pieces in this way."
330 PRINT "if it is at all possible. If it is NOT possible, you forfeit!"
340 PRINT "your turn by entering 00 for your (Row Column) move." :PRINT
400 INPUT "Should I wait before making my move (Y or N)";QS:PRINT
410 F1=0: IF QS="Y" OR QS="N" GOTO 450
420 IF QS="Y" OR QS="N" THEN 460 ELSE GOTO 400
440 F1=1:PRINT "O.K. Hit RETURN to let me have my turn."
460 INPUT "Should I play my best strategy (Y or N)";QS:PRINT
470 S1=0: IF QS="Y" OR QS="N" GOTO 520
480 IF QS="Y" OR QS="N" THEN 510 ELSE GOTO 400
510 S1=1
520 B1=0:W1=2:D$(B1+1)=IS
550 D$(2)=" ";D$(W1+1)=JS
570 FOR X2=1 TO 8: READ I$(X2): NEXT X2
600 DATA 0,-1,-1,-1,0,1,1,1
610 FOR X2=1 TO 8: READ J$(X2): NEXT X2
640 DATA 1,1,0,-1,-1,-1,0,1
650 FOR X1=1 TO 9: READ C$(X1): NEXT X1
680 DATA 2,A,B,C,D,E,F,G,H
690 REM - SET UP THE GAME
700 FOR I1=1 TO 10
710 FOR J1=1 TO 10
720 K1=(I1,J1)=1
730 NEXT J1
740 NEXT I1
750 A$(5,5)=A$(6,6)=W1
770 A$(5,6)=B$(A$(6,5)=B1
790 C1=2:H1=2:W1=4:E1=0
830 REM - HUMAN'S CHOICES
840 PRINT "Do you want to have ";IS;" or ";JS:" (Black or White)";QS:PRINT
850 QS=CHR$(12)
880 IF QS="Y" OR QS="N" GOTO 920
890 IF QS="Y" OR QS="N" THEN 900 ELSE GOTO 400
900 C1=B2:H1=W2
920 INPUT "Do you want to go first (Y or N)";QS:PRINT
930 PRINT CHR$(12);: GOSUB 3100: REM PRINT INITIAL BOARD
940 IF QS="Y" OR QS="N" GOTO 980
950 IF QS="Y" OR QS="N" GOTO 1020 ELSE GOTO 400
980 Y1=0: Y9=0: GOSUB 3200: GOTO 1690
990 REM - COMPUTER'S MOVE
1000 Y9=10: GOSUB 3200
1006 FOR I1=1 TO 10
1007 PRINT I1
1008 NEXT I1: IF F1=0 GOTO 1020
1009 Y9=10: GOSUB 3200
1010 PRINT "Hit RETURN when you're ready": Y9=Y1
1015 GOSUB 3200: PRINT "for me to go!";: INPUT LINE QS
1020 B1=0:J1=0:J2=0
1030 X9=40: Y9=12: GOSUB 3200
1040 T1=C1:T2=H1
1060 B1=1: SCAN FOR BLANK SQUARE
1065 Y9=Y1+1: GOSUB 3200
1067 PRINT "Counting to eight:"; Y9=Y1+1: GOSUB 3200
1070 FOR J1=1 TO 9
1080 FOR I1=2 TO 9
1090 IF A$(I1,J1)<1 THEN 1380
1120 GOSUB 2620
1130 IF F1=0 THEN 1380
1140 REM - FORM AN OPPONENT AS A NEIGHBOUR
1150 REM - HOW MANY OF HIS PIECES CAN WE FLIP?
1160 REM - (DON'T DO IT NOW!)
1170 D1=1
1180 GOSUB 2830
1190 REM - EXTRA POINTS FOR BOUNDARY POSITION
1200 IF D1=0 THEN 1380
1210 IF (I1-2)*(I1-9)<0 THEN 1230
1220 S1=S1+S22
1230 IF (J1-2)*(J1-9)<0 THEN 1260
1240 S1=S1+S22
1250 REM - IS THIS BETTER THAN THE BEST FOUND SO FAR?
1260 IF S1>S12 THEN 1380
1270 IF S1>S12 THEN 1340
1280 REM - A TIE. RANDOM DECISION
1300 R=RUN(0):IF R>5 THEN 1380
1340 B1=S1:I1=I2:J1=J2:J2=J1
1380 NEXT J1
1385 PRINT " ";I1-1;
1390 NEXT I1:PRINT
1410 IF B1=0 GOTO 1470
1420 Y9=Y1+2: GOSUB 3200
1430 PRINT "I have to forfeit my move."
1440 IF J1=1 GOTO 2185
1450 J1=1:GOTO 1690

```



```

*** PUTC1 - PRINT A-REG CHAR
PUTC1 PSMS X,B,A -PUT CHAR
      LDX PORT,PCR
      STA 0,X
      LDA 0036 -STROBE LO
      STA 1,X
      BSR RTRN -WAIT 20 usec
      BSR RTRN
      LDA 003E -STROBE HI
      STA 1,X
      LDA 01
      BSR TIAR -WAIT 1 ms.
      PULS X,D,A
      CMFA 0000 -CR?
      BEQ CHAIT
      INC CCNT,PCR
      RTS

*** CHAIT - TIME CARRIAGE RETURN
CHAIT PSMS A -CALC PRINT HEAD POSN
      LDA CCNT,PCR -GET CHAR COUNT
      ADDA 05 -ADD MARGIN
      STA CCNT,PCR
      LDA 040 -WAIT 40 ms/CHAR
      BSR TIAR
      DEC CCNT,PCR
      BNE CHAIT
      PULS A,PC

*** CHEN1 - ZERO WAIT CHECK
CHEN1 DRCC 0000
      RTS

*** TIMR - WAIT A-REG 0ms=0c
TIMR PSMS 0 -CALC NO. OF LOOPS
      LDB FAC1,PCR
      MUL
      EXG A,D -WASTE TIME
      EXG A,B
      SUBD 01
      DPL TIMR1
      PULS B
      RTS

C300 00 ENDS FCB 0
      END

```

0 ERROR(S) DETECTED

SYMBOL TABLE:

CCNT	C312	CHEK	C300	CHEN1	C373	CLOS	C305	CHAIT	C35E
CHAIT1	C368	ENDS	C300	FAC1	C313	INIT	C302	INIT1	C314
INIT2	C329	PORT	C30E	PUTC1	C308	PUTC1	C330	RSUD	C311
RTRN	C387	STAC	C310	STZE	C300	TIMR	C376	TIMR1	C37C

## word's worth

P.O. Box 28954  
Dallas, Texas 75228  
(214) 321-9285

Don Williams, Publisher  
'68' Micro Journal  
5900 Cassandra Smith  
Computer Publishing Center  
PO Box 849  
Hixson, Tennessee 37343

11 March 1982

Dear Mr. Williams:

A customer recently called to inform me of a problem he was having with WW Small-C. It turned out that the problem was with the TSC assembler. The problem is with macros, which are used extensively by C and RLOAD for generation and linking of relocatable modules. Anyone who is thinking of purchasing WW Small-C should check his assembler, and if necessary, get the updated version from ISC.

The assembler may be easily checked by entering the example called 'TEST' listed on page 49 of the TSC assembler manual. If this example generates assembler errors, then you have the old assembler. I was under the impression that even though the assembler generated errors, that the code generated was good. However, that has been shown to be wrong.

Apparently, there are a number of TSC customers who have not made this upgrade, even though the new version of the assembler has been out over a year. Thank-you,

*Howard Lee Harkness*  
Howard Lee Harkness

Dear Don,

This little BASIC program probably won't astonish anyone. I'm sending it in because the idea behind it might be of interest, especially to other DYNAMITE users.

I prefer maintaining my label reference files in the form LABEL EQU \$HMMH because it allows me to run them through the assembler, printing out a neat listing in hex address sequence and then a sorted symbol table. If the files are organized a

bit, the result is a handy set of "reference cards" that can save a lot of looking through manuals.

The same files can then be used as source for DYNAMITE by just running CNVRTEQU on them and assembling into a binary file.

Art Waller  
3217 Pagosa Court  
El Paso, TX 79904  
(915) 755-2516

February 24, 1982

```

100 REM * CNVRTEQU.BAS
110 REM * THIS TSC BASIC PROGRAM CONVERTS
120 REM * ASSEMBLER COMPATIBLE "EQUATE" LISTS
130 REM * FOR USE WITH "DYNAMITE"
140 INPUT " INPUT FILE NAME", I$
150 INPUT " OUTPUT FILE NAME", O$
160 OPEN NEW O$ AS 2
170 OPEN OLD I$ AS 1
180 ON ERROR GOTO 330
190 REM * READ AND CONVERT FILE
200 INPUT #1, A$
210 IF A$="" THEN 200
220 IF LEFT$(A$,1)="/" THEN PRINT #2, A$ : GOTO 200
230 P=0
240 P=P+1:IF MID$(A$,P,1)<>" " THEN 240
250 L$=LEFT$(A$,P-1)
260 L$=L$+" ":L$=LEFT$(L$,6)
270 P=P+1:IF MID$(A$,P,1)<>"$" THEN 270
280 R$=MID$(A$,P,5)
290 IF RIGHT$(R$,3)="END" THEN 320
300 PRINT #2, " FCC ";CHR$(39);L$;CHR$(39)
310 PRINT #2, " FDB ";R$
320 GOTO 200
330 IF ERR<>0 THEN ON ERROR GOTO 0
340 CLOSE 1
350 INPUT " ANOTHER F. ", E$
360 IF LEFT$(E$,1)<>"Y" THEN 390
370 INPUT " INPUT FILE NAME",I$:RESUME 170
380 REM * CLOSE OUT
390 PRINT #2, " FCC ";CHR$(39);" ";CHR$(39)
400 PRINT #2, " FDB 0"
410 PRINT #2, " END"
420 CLOSE 2
430 PRINT "CONVERSION COMPLETE"
440 END

```

Dear Publisher: I am a subscriber of your magazine and I like it very much. I would like if you could publish in one of the next months a "floating point routine for the '6809', with division, binary to BCD, etc". (25 \$K)

Sincerely yours,

GEZA HOLZHAKER  
760 OAK WALK APT. E  
GOLETA, CA 93117  
PHONE: (805) 686-6843



TEXAS COMPUTER

817-275-1848 • P.O. BOX 120816 • ARLINGTON, TX 76012

Dear Don:

TEXAS COMPUTER would like to announce the immediate availability of our MCOM home control software for OS9 systems.

The MCOM software is a OS9 utility program that gives the user control over all 256 BSR type controller modules. The software is supplied on 5 1/4 disk with a cable adapter to fit RADIO SHACK'S PLUG N' POWER(tm) controller (026-11821). The user need only have an OS9 system and a parallel port!

The user can personalize the software for their particular system, connect the controller box and run. MCOM is provided as a system utility and as such can be called from almost all software available to OS9 users.

The software provides user configured parameters such as system speed, port addressing, and several repetition parameters for use in noisy electrical environments. In addition to the six standard commands available we have added two NEW COMMANDS, LOCK and UNLOCK. These new commands allow you to LOCK all devices under your control, a feature that no one else seems to offer!

MCOM software is available immediately for PERCOM OS9 systems and by the time this gets to print should also be available for OS9 systems using GIMIX 058 type controllers. If enough responses are generated for other systems we will consider offering the software for them. Sorry, but no source code will be sold. Documentation is COMPLETE and provides all info necessary to configure MCOM for your system. The complete package is available for \$35.00 + \$3.00 shipping. Texas residents please add 5%.

PLUG N' POWER is a trademark of RADIO SHACK.  
OS9 is a trademark of MICROWARE SYSTEMS CORP.  
GIMIX is a trademark of GIMIX INC.

Sincerely,

*Dave C. Bolan*  
Dave C. Bolan



OUTER LOOP CHIROPRACTIC CENTER	LA GRANGE FAMILY CHIROPRACTIC CENTER
6540 Outer Loop	104 West Madison Street
Louisville, KY 40220	La Grange, KY 40031
(502) 966-8281	(502) 222-466-8201

Dear 68 Micro Journal,

I have subscribed to your magazine for over a year now and find it extremely informative and useful. I started into microcomputing in 1976 with a Sanyo 6800 bit and have since acquired two 6800 systems: 50K Sanyo 6800 running FLEX with the OMAF2 and a 16K Radio Shack Color Computer. (Your publication convinced me to purchase the latter.)

I'm sure all most of us appreciate the quality of TSC's software. Their version of Extended BASIC is comprehensive and fast. Why, however, do they choose to report programming errors with those crummy, incomprehensible error codes? The FLEX operating system has a wonderful error MESSAGE reporting system already built into it. It's a mystery to me why TSC Extended BASIC does not use it.

I have coded a small assembly language patch for Version 17 of TSC's Extended BASIC for the 6809. The patch causes BASIC to scan the ERRORS.BY5 file for the appropriate error message instead of reporting an error number code. You should assemble the patch code and APPEND it to KBASIC.COM.

You must also edit the ERRORS.SYS file to include the appropriate error messages for Extended BASIC as found in the Users Manual. (See listing below.) It's OK to use the BASIC EDITOR for the editing job; however, you must convert the sequential file output of the editor into a random file structure containing 63 characters per record. A short BASIC program can do the sequential to random conversion. (See below.)

The patch case has only been tested with Version 17 of TBC's Extended BASIC but should work for any of TBC's 6800x versions provided that you can locate where to place the patch. I found the location using TBC's DEBUG package. First look for the memory block that contains the text "ERROR 0". In any case, the test is located at MEM 0B84 through 0B8B. Then look for a nearby LEAD 8...., PCR command (HEX 830E50) which references the text. DEBUG's Disassemble function will tell you the address of the PCR. In Version 17 the core is located at MEM 0B78. Assemble the patch 6B8C.

Sincerely Yours,

Dr. L.D. Pukh

Dr. Laurence D. Preble

Listing of modified ERRORS.BYS file  
(must be created as a random file with 83 characters per record)

```

ILLEGAL FFUNCTION CODE ENCOUNTERED
THE REQUESTED FILE IS IN USE
THE FILE SPECIFIED ALREADY EXISTS
THE SPECIFIED FILE COULD NOT BE FOUND
SYSTEM DIRECTORY ERROR - REBOOT SYSTEM
THE SYSTEM DIRECTORY SPACE IS FULL
ALL AVAILABLE DISK SPACE HAS BEEN USED
READ PART OF FILE
DISK FULL READ ERROR
DISK FILE WRITE ERROR
THE FILE OR DISK IS WRITE PROTECTED?
THE FILE IS PROTECTED - FILE NOT DELETED
ILLEGAL FILE CONTROL BLOCK SPECIFIED
DISK OR DISK DRIVE NOT ENCOUNTERED
AN ILLEGAL DRIVE NUMBER WAS SPECIFIED
DRIVES NOT READY
THE FILE IS PROTECTED - ACCESS DENIED
SYSTEM FILE STATUS ERROR
FMS DATA INDEX RANGE ERROR
FMS INACTIVE - REBOOT SYSTEM
ILLEGAL FILE SPECIFICATION
SYSTEM FILE CLOSE ERROR
SECTOR OR TRACK OR DISK TOO SEGMENTED
NONEXISTENT RECORD NUMBER SPECIFIED
RECORD NUMBER MATCH ERROR - FILE DAMAGED
COMMAND SYNTAX ERROR - RETYPE COMMAND
COMMAND NOT ALLOWED WHILE PRINTING
WRONG HARDWARE CONFIGURATION

```

```

859 DATA TYPE MISMATCH IN "PRINT USING"
860 ILLEGAL FORMAT IN "PRINT USING"
861 MIXED MODE IN AN EXPRESSION
862 ILLEGAL EXPRESSION
863 ARGUMENT <0 OR >255
864 ARGUMENT >32,767
865 ILLEGAL VARIABLE TYPE
866 ARRAY REFERENCE OUT OF RANGE
867 UNDIMENSIONED ARRAY REFERENCE
868 BAD ARGUMENT IN "SWAP" STATEMENT
869 MEMORY OVERFLOW
870 ARRAY OVERFLOW
871 STRING TOO LONG
872
873
874
875
876
877
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879
880 UNDEFINED USER FUNCTION
881 UNDEFINED USER CALL
882
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886 BAD STRING LENGTH SPECIFIED
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```
DATA TYPE MISMATCH
OUT OF DATA IN "READ"
BAD ARGUMENT IN "ON" STATEMENT
33
PROGRAMMABLE BREAK (CONTROL-C) TRAP
35
FILE "ESCAPE RETURN" SEQUENCE TRAP
38
39
BAD FILE NUMBER USED
FILE ALREADY OPEN
MUST OPEN FILE AS "NEW" OR "OLD"
FILE HAS NOT BEEN OPENED
FILE STATUS ERROR
FIELD SIZE ERROR (>252 OR <0)
CONST EXTEND A SEQUENTIAL FILE
RECORD C NOT ALLOWED
MUST USE RANDOM TYPE FILE
49
UNRECOGNIZABLE STATEMENT
ILLEGAL CHARACTER IN LINE
SNTAX ERROR
ILLEGAL LINE TERMINATION
LINE NUMBER C NOT ALLOWED
UNBALANCED PARENTHESES
ILLEGAL FUNCTION REFERENCE
MISSING QUOTE IN STRING CONSTANT
MISSING "THEN" IN AN "IF" STATEMENT
59
LINE NOT FOUND
RETURN WITHOUT "GOTO"
"FOR-NEXT" NEST ERROR
CAN'T CONTINUE
SOURCE NOT PRESENT
BAD FILE - WON'T LOAD
"RESUME" NOT IN ERROR ROUTINE
CAN'T CHANGE SCALE FACTOR
```

```

10 REM ***** CONVERT SEQUENTIAL FILE TO RANDOM FORMAT *****
20 INPUT "SEQUENTIAL FILENAME",FF#
30 OPEN OLD FF# AS I
40 INPUT "NEW RANDOM FILE NAME",R#
50 INPUT "RECORD LENGTH",RL#
60 OPEN NEW R# AS O
70 DIM B(2,4096)
80 FOR I=1 TO 13:GOTO(13)+CDB(10)
90 FOR J=1 TO RL-2:J=J+1:R#>I+CDB(0)+J:J=J+1
100 ON ERROR GOTO 170
110 FOR J=1 TO 3000
120 INPUT LINE B(J,4)
130 R#>J+1:R#>1:R#>63
140 R#>J+1
150 NEXT J
160 CLOSE I:CLOSE R#
170 IF ERROR THEN RESUME 160
180 ON ERROR GOTO 0:RESUME

```

- \* PATCH TO ISC APPX EXTENDED BASIC (X-BASIC)
- \* TO CAUSE ERROR FILE TO BE READ WHEN ERROR OCCURS
- \* MODIFY ERROR.BYB TO INCLUDE THE BASIC ERROR SUMMARY

EXTERNAL DEFS			
CC20	ERRTYP	EQV	CC20 STORAGE AREA FOR ERROR CODES
CD3F	APIERR4	EQV	CD3F FL11'B REPORT ENRCK ROUTINE
CD24	PCRLS	EQV	CD24 PRINT CR & LF

2 PATCH BUDE IS PLACED IN MEMORY WHERE BASIC WAS ORIGINAL  
3 ABOUT TO PRINT "ERROR 8" -- (NO; NEEDED NIN)

```

007A      ORG      VOB7A
007B      B7A      ERM7VP
007D      BE      CC1F      LD      ERM7VP      ; set up x-reg for RPIERR
0081      B0      CD3F      JSR      RPIERR      ; report the error
0083      B0      CD24      JSR      PCHLF      ; carriage return = linefeed
0086      B2      NOP      ; cover up last two data
0088      END

```

Q ERROR(S) DETECTED

SYNTHETIC TABLE 1

ERRATA: 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1400, 1401, 1402, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1474, 1475, 1476, 1477, 1478, 1479, 1480, 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488, 1489, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523, 1524, 1525, 1526, 1527, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1540, 1541, 1542, 1543, 1544, 1545, 1546, 1547, 1548, 1549, 1550, 1551, 1552, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1580, 1581, 1582, 1583, 1584, 1585, 1586, 1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596, 1597, 1598, 1599, 1600, 1601, 1602, 1603, 1604, 1605, 1606, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1630, 1631, 1632, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1646, 1647, 1648, 1649, 1650, 1651, 1652, 1653, 1654, 1655, 1656, 1657, 1658, 1659, 1660, 1661, 1662, 1663, 1664, 1665, 1666, 1667, 1668, 1669, 1670, 1671, 1672, 1673, 1674, 1675, 1676, 1677, 1678, 1679, 1680, 1681, 1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1788, 1789, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801

OVERLAYS FOR EIRIQ AND GMD-00007T-PASCAL

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## INTRODUCTION

EMERG MANCOMBAT CORPORATION (Electronic Systems Department) is in the process of developing an irrigation management system. We are currently using a 6800 microprocessor, a PT23C1 8 dual floppy disk drive (whose average seek time is about 50 mill-seconds, which is considerably faster than conventional floppies run by stepper motor) and printer (hardware design are done by our Electronic Systems Department). The system runs under the files operating system. All our programs are written in assembly language and are typically run by Omegasoft, which generates 6800 assembly code. The system is composed of a host computer (the IBM) and two satellites (satellite is actually a computer board with a 6800 microprocessor, A/D converter and radio interfaces). Each satellite is linked to the host computer through a two-way radio which enable them to communicate within a radius of two to three miles. Two types of satellite will be deployed into the field during our development and evaluation stage; they are the "data" sensor and "push" monitoring satellites. These satellites can collect data over a certain time period and then transmit the time and the collected data to the host computer through radio. On the other hand, the host computer has to provide the following services:

1. **BACKGROUND TASKS.** This includes

- a. Listening and responding to data dumps.
  - b. Periodically transmitting station ID in Morse Code.
  - c. ModeM transmission which allows Energy Management Corporation to connect the system and activities in the farm which may be a thousand miles away.
2. BACKGROUND TASKS. (OPERATOR INTERFACE) This includes
- a. Satellite initialization procedures.
  - b. Analysis of the received data.
  - c. Retrieving the satellite data from disc and displaying it.
  - d. Editing the scheduler table which the timing of tasks at end of the foreground task is based upon.
  - e. Reading the real time clock.

Two major problems arise in the development process. First, 68000 is an 8-bit microprocessor so the memory space available is limited. Although there are 64k bytes in our memory board, unfortunately, about 14k bytes are used up by the memory mapped I/O routines and system monitor. To make the situation worse, the Pascal compiler generates an enormous amount of codes which is intrinsic to the target hardware. Compiling the system program on the host computer leaves only about 10k bytes remained for the 32k of codes left to be done and for future enhancement. Although we thought of moving to a 16-bit microprocessor, it seems very remote that the 16-bit machine will be ready before our system implementation deadline. In addition, the cost of the 16-bit systems are far greater. As a result, we have to make the most of the 68000 system.

Second, as described above, our system consists of foreground and background tasks which in essence is a multi-tasking system. However, our operating system, Jflex, is a single task system. Since running a background task can prevent data communication which we do not want the central to miss, we decided to implement our multi-tasking system. The following article describes the design of our multi-tasking system. The most recent two articles will write another article on our multi-tasking system.

The FINAL RESULT is quite satisfactory, about 9k bytes on memory are saved. On top of that, we gain a lot of flexibility in expanding our host computer program since we can add virtually as many overlay segments to our existing system as we want. The only limitation is that the size of the overlay segment cannot exceed the memory available.

To save even more memory space, you might even consider finding a way to get rid of redundant run time library routines. Run time library routines are attached at the bottom of each overlay segment. However, the root section also has some library routines attached to it. Since the root section is linked and loaded alone in order to generate the binary output of the root, unfortunately, we cannot find an easy method to do away with these redundant library routines.

ANY reader who is interested in our system (either the irrigation management system or the computer system which can be sold separately) can contact our Electronic Systems Department manager Mike Birch at:

Energy Management Corporation  
19286 S. Vermont Avenue  
Cerritos, CA 90706.  
(213) 919-2218

## OVERLAY SYSTEM

The overlay system is a simple solution to our memory problem, and is very easy to implement. The computer memory can be visualized as two separate sections as shown in Figure 2. The first section is called the root section. The second section is called the overlay section. The root section contains the program, the operating system, and the user's program. The overlay section, utility modules and modules that will be called frequently should also reside in this section. Modules that are used to perform distinguishable tasks and are less frequently used will be organized into overlay modules. Each overlay module can have processes local to it and can be loaded and unloaded from the root section. Each overlay module uses its local procedures thus forming the overlay segment. These overlay segments will be stored to disc files, when an overlay segment is needed, a special program called LOAN (shown in fig 1) is used to load the overlay segment from disc to overlay section. Only one level of overlay is allowed. This means that the program can be loaded into the root section, the root segments and thus degrading system performance. In other words, only the main program is allowed to bring in overlay segments.

Overlay segments are allowed to use modules that are local to the root section, so all external symbols have to be resolved. Moreover, both the root and overlay sections are shared the same user stack because the two sections can only communicate with each other through global variables. The user stack is used to store unresolved external symbols and the user stack pointer from the program is used to store the address of the first overlay segment with the root separately. Our Pascal Compiler vendor (OmniSoft, Sonoma, CA) has supplied us a linker creator which is used to build the control files (filemgr.JC - see example 1 and 2, filename.PS - system and user stack setup code) necessary to establish and link the output of the linker with the user stack. In this linker creator, so that it adds the user where he wants to load the overlay segment, it seems obvious that the overlay segment should be loaded right after the root section; however, we suggest that some room should be left between the two sections so that each time if the root section grows in size, you do not have to run the linker creator for each segment. To make the linking process even less painful, the linker creator can be modified so that it can be invoked by the EXEC command of files will process these commands as if they were typed from the keyboard.

The output of the linking loader is a binary file which contains both the root and overlay segments. The final process is to discard the root leaving the overlay segment to be stored on disc. To accomplish this, the SYR (enable discmode provided by fill) is used. The SYR command is used to set the disc mode of the disk. The first step is to find the address of the end address of the binary output using the MAP command. The second step is to load the binary file to memory using the GET command. The third step is to set the portion of memory you need. The third and fourth parameter define the location and ending addresses of the section of memory to be written on the disk. The fifth parameter is the transfer address which is the address of the first byte of the overlay segment. As you can see in the example, the transfer address is always 4288. Instead of 4228. This is due to the fact that original modules are assembled as if they were Pascal code programs. Executing the first nine lines of code will cause the program to jump out of the overlay segment (see example 3) to see how the program is affected by the disc mode of the system. The next line is the out offset. Also make sure that the main module of a segment is always loaded at the top of a segment so that on entry to an overlay section, its main module is always executed first.

```

NAME LCLR
IDEL LOADER
PORGIN :2.1.02
*RY 10.6
*DESCRIPTION: THIS ROUTINE OPEN A BINARY FILE, LOAD IT INTO MEMORY AND
*SYNOPSIS
15. THE BINARY FILE NAME IS PASSED FROM A PASCAL PROGRAM. FIRST, AN
ORIGINAL EXPLANATION HAS TO BE MADE.
PROCEDURE LOAD (VAR Filename :STRING(8)); BEGIN
TRAN,
PROGRAM CODE
FILENAME := 'OP CLK';
LCAT (FILENAME); [ LOAD THE OP_CLK SEGMENT AND
SYNOPSIS]
USER STACK UPON ROUTINE ENTRY USER STACK UPON ROUTINE EXIT
BOTTOM OF STACK BOTTOM OF STACK
STRING ADDRESS
STATIC LABEL
TOP OF STACK
***** START ROUTINES *****
PMS EQU $24FC ENTRY POINT FOR ALL CALLS TO THE FILE
MANAGEMENT SYSTEM. A FUNCTION CODE WHICH
IDENTIFIES THE FILE MANAGEMENT TASK TO BE MUST
BE STORED IN THE FUNCTION CODE BYTE OF RA.
CM ENTRY REGISTER MUST CONTAIN THE ADDRESS OF
FCF.
PCB EQU $CDB3 ENTRY POINT
PCB EQU $C248 FILE CONTROL BLOCK. USER COMMUNICATES WITH THE
FILE MANAGEMENT SYSTEM THROUGH THIS FILE
CONTROL BLOCK.
PMS CALL. CLOSE ALL FILE.
PMS EQU $2402
CBIN EQU $C350 FILE LOADER. ON ENTRY, PCB MUST CONTAIN THE
NAME OF THE FILE WHICH WAS OPENED FOR
BINARY READING. IF A TRANSFER ADDRESS IS
UNCONTAINED, THIS ADDRESS WILL BE PLACED AT
$CC16. TRANSFER ADDRESS IS THE ENTRY POINT FOR
THE BINARY PROGRAM.
***** END OF SYSTEM ROUTINES *****
LOADER PMS Y SAVE THE CONTENT OF REG Y WHICH IS USED BY THE
COMPILED
SET OF FILE SC IN FILE CONTROL BLOCK

```

```

LDI    #012      BRC 1 POINTS TO FILE CONTROL BLOCK
LDI    #32700    ADDRESS OF FIRST BYT6 OF STRING CONSTANT
BAYILL LDA    0,1-  LOAD CHARACTER TO REG A
STA    0,2-      STORE IT IN PC1
CMPT    #0127    CERGE [1] END OF SYING CONSTANT
BMO     BAYILL   BRC 1 POINTS TO FILE CONTROL BLOCK
LDI    #0127    FILENAME STARTS AT BYT6 4 OF TCS
LEAX    4,7      LOAD ADDRESS OF FILENAME
LDI    1,0       FIRST BYT6 HAS THE DYNAMIC LENGTH
LDA     0,7-     INCREMENT CHARACTER COUNT BY 1
G_NAME DECA     CHECK IF INC OF FILENAME
BM      OPEN    STORE ONE CHARACTER OF filename TO PC1
LDA     0,7-     INCREMENT ADDRESS TO STRING BY 1
LEAX    1,7      INCREMENT ADDRESS TO PC1 BY 1
LEAX    1,2
BNA     G_NAME   STORE ONE CHARACTER OF filename TO PC1
LDI     #0127    CALL FILE MANAGEMENT SYSTEM
JSR     RMS      CA RIT, THE CPU I-CONDITION CODE IS SET IF NO
BNA     ERROR    IS SUFFICIENT TO REPORT ERROR
*
RETURN  LDR     #0177  SET SPACE COMPRESSION FLAG FOR BINARY READING
STD     0,0,X
CLBL
CLBL
STC
JSR     CBLAN
JSR     [SCCIT]
LEAC    3,0      CLEAN UP TPR USER STACK
FULS    Y        RESTORE CONTENT OF REGISTER Y
BTS
ERROR   BPTERR   NO LOADER OFFSET
JSR     PMSCL    LOAD THE FILE AND CLOSE IT
BNA     RETURN   EXECUTE THE PROGRAM
                        CLEAN UP TPR USER STACK
                        RESTORE CONTENT OF REGISTER Y
                        CLOSE ALL FILES
*
*      --- OPEN FOR PIAL
*      ---WRITE DUMPER
*      /---FILENAME---\
SETUP   PC1 1,0,0,1,0,0,0,0,0,0,0,0,0
SET     PC1 2,0,0,1,0,0,0,0,0,0,0,0,0
EQC     12
INC

```

FIG 1

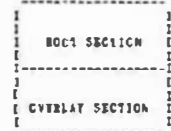


FIG 2a

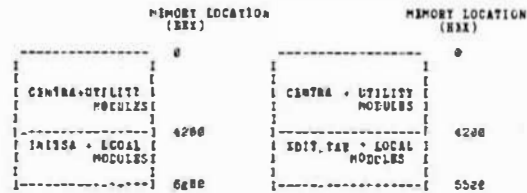


FIG 21

FIG 2c

```

STEP=setup                                (set load address of load module)
LOAD=CENTRA.PA CENTRA.ca LOAD=NO CLEDR=NO bSCHED=NO JUMP=NO IO=NO
LOAD=FIX.LO NO CENT12.NO & TSS.NO
LOAD=BCFCBR.NO AR17C.NO                  (direct linker to load the specified file)
CURP=6c200                               (modifies the current loader location counter)
LOAD=INITSA.NO STO_Sch.NO SEOU_SCh.NO    (load overlay segment)
LIB=V.B1
CRJ=INITSA.B1M                            (object file name)
PAFC
EXIT

-----example 1 (language creator output INITSA.SC for linking segment
INITSA with root section) -----

STEP=setup
LOAD=CENTRA.PA CENTRA.ca LOAD=NO CLEDR=NO bSCHED=NO JUMP=NO IO=NO
LOAD=FIX.LO NO CENT12.NO & TSS.NO
LOAD=BCFCBR.NO AR17C.NO
CURP=6c200
LOAD=FULL_TAP.BC STO_Sch.kQ BBDR.NO SEOU_SCh.NO
LIB=V.B1
CRJ=FULL_TAP.B1M
PAFC
EXIT

```

```
----- example 2 (linage creator output IDIT_TAB.SC for linking
segment IDIT_TAB with root section) -----
```

CHAIN CENTRA (assembles programs in the root section. The outputs of chain is CENTRA.OA (assembled output) WOTCH.BIN (if used by all the LI below and CENTRA.BIN which is the binary output)

```

LL <INITIAL.SC
LL <EDIT_TAN.SC
LL <SIM_DATA.SC
LI <FOM_DATA.SC
LL <OP_CLX.SC
LI <WAIT.SC
LI <EDIT_TAN.SC
LI <DUMP.SC

```

```
----- example 3 (Exec file to link and load all the overlay segments.
Each segment will have its binary output)
```

MAP INTRA.BIN  
 G17 IN17SA.BIN  
 SAGE,IN17SA.BIN,4200,6000,4200  
  
 MAP BD17\_1AB.BIN  
 DT BD17\_7AB.BIN  
 SAGE,BC17\_7AB.BIN,4200,5500,4200

----- example 4 -----

# PROGRAM EXAMPLE (INPUT,OUTPUT):

{If the transfer address is \$422F, then a branch to the dummy main program will be executed}

```
PROCEDURE MAIN ENTRY:      {The offset from the beginning of this module
  BEGIN                    {to the entry point of this external module is
  1                         10 bytes.
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For Sale: Tano 48K 6800 With Dual Serial Ports, Dual 5" Drives, Electric Word Processor, TSC Editor and XBasic, Flex Dos \$2395.00  
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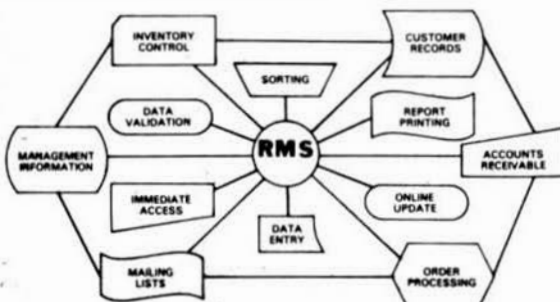
# 6809

RECORD MANAGEMENT SYSTEM

# RMS

# DATABASE MANAGEMENT

- USER DEFINED RECORD FORMAT VIA DATA DICTIONARY
- SCREEN ORIENTED, FORM FILL OUT TYPE OF ACCESS
- OPTIONAL TWO LEVEL RECORD HIERARCHY
- ALL FILES IN ASCII TEXT FORMAT, BASIC COMPATIBLE
- DIRECT ACCESS BY KEY FIELD, MULTIPLE INDEX FILES
- EXTENSIVE DOCUMENTATION, SAMPLE APPLICATION
- VERSATILE, PROFESSIONAL QUALITY REPORT WRITER
- BUILT-IN SORT/MERGE
- EASY TO USE



RMS is a complete DATABASE MANAGEMENT package for the 6809 computer. It is made up of five machine language programs that make up the most powerful business programming tool available for the 6809. It can be used by the relative novice, to implement an incredible variety of information storage and retrieval applications, without any programming. However, the programmer can use RMS as part of the solution to a larger problem, saving many hours of unnecessary program development time. RMS can be used to handle data input, editing, validation, on-line retrieval, sorting and printed reports. Custom data manipulation can be filled in by the user's BASIC programs.

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# 6809 Relocating Recursive Macro Assembler & Loader/Linker with text editor

- Runs on 6809 system (in as little as 32k)
- Interactive or non-interactive (batch) mode
- Supports relocatable and absolute code
- Can assemble 6800 & 6801 source and generate 6809 object
- CROSS ASSEMBLER MODE--can assemble 6800 & 6801 source and generate 6800 & 6801 object
- 8 character global and local labels
- 76 English error messages
- Alphabetized or non-alphabetized symbol table
- Cross reference table
- Checks for unreferenced labels
- Can enable the insertion of a 'SWI' after every instruction
- Supports the following assembler directives: ASECT, CSECT, PSECT, DEBUG, END EQU, EXEC, EXT, FCB, FCC, ID, INT INCLUDE, NAM, OPT, ORG, PAG, RMB SET, SETDP, SPC, TTL, FDB
- Program sectioning (ASECT, CSECT, or PSECT)
- Source of I/O routines supplied
- Total FLEX\* compatibility
- Powerful co-resident text editor
- TSC source file compatibility

## Powerful Macro Capabilities

- 8 character symbolic (substitution) labels
- branch on conditions EQ, NE, LE, LT GT, GE
- supports nesting
- Logical, arithmetic, and string labels
- Sublist processing
- Powerful string functions such as SUBSTRING
- Supports the following directives ACNT, AGO, AIF, ANOP, GBLA, GBLB, GBLC LCLA, LCLB, LCLC, MACRO, MEND, MNOTE SETA, SETB, SETC

## Loader/Linker

- Link and load (with offset)
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- Global cross references
- Supports the following commands LOAD, COMPARE, SAVE, EDIT, LINK, MAP INTERNALS, UNDEFINED, CLEAR, RUN SECTION, FIX

MASM 6809 ----- \$ 250.00

User's Manual Only (about 200 pages--refundable)---  
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A version of the above assembler which generates ABSOLUTE code is also available

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The above software is available on 5 or 8 inch FLEX\* disks, prices include one year maintenance (single CPU). Even if you already own an assembler you should seriously consider ordering these powerful tools.

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# CP/M ON THE SS50 BUS

## Why CP/M?

We all know that productivity is increased with good software. Most of us have found that we have more fun when using software correctly designed for our specific tasks. CP/M has over 2000 application programs. With CP/M you can get the exact program to fit your needs and budget. There is also a large selection of programs available for the cost of the media through the CP/M users' groups. The latest developments are available under CP/M—even an ADA language subset. Simply put, the application programs available under CP/M are unequalled anywhere in the known universe.

## How to Install the Z809

Plug the Z809 Board in an unused SS50 slot. On most SS50 systems, just boot the system using the CP/M disk and you are up and running.

## How does the Z809 Softboard System work?

All I/O functions of the Z809 are directed through the 68XX system CPU board. Use your current disk controller board, CPU, memory, disk drives, printer, and terminal with standard SS50 configurations. The Z809 does not affect use of the system CPU. The Z809 does not replace your CPU board. It uses your 68XX as an I/O processor. To change back to your current operating system, just boot the system with the appropriate disk.

## Other Information on the Z809

META LAB has designed the basic input output system (BIOS) of CP/M to take full advantage of the physical characteristics of your disk drive. The BIOS drivers allow you to dynamically specify all characteristics of your diskettes and drives. The software is reconfigurable when you expand your system with more memory or hard disks. The Z809 is compatible with standard CP/M formatted disks so that software is easily exchanged or ported to other systems. The board runs at 4 Mhz when run on a 2 Mhz SS50 system. It executes Z80/8080 object code. Minimum memory requirements are 24K, however some application programs require 56K. The Z809 supports up to 56K of system memory. The Softboard is designed to be an expandable and adaptable part of your total computer system.

## Breakthrough in SS50 Computing

The Z809 is the most useful peripheral board you can add to your system. We've put the best of both worlds together for you. Each Z809 Softboard System comes with a 50 pin processor board, user manual, CP/M 2.2 operating system specifically tailored to your CPU and disk controller board, and complete CP/M reference manuals. Total System Cost \$595

## SPECIAL 60-DAY INTRODUCTORY OFFER

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Orders must be received by May 31, 1982

META LAB, established in 1974, is dedicated to the research and development of 68XX technology. All of our products are built with industrial grade components. Boards are burned-in and tested completely before shipping. A full year limited warranty assures reliable performance.

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DAC1220 \_\_\_\_\_ Other \_\_\_\_\_

6800 User \_\_\_\_\_ 6809 User \_\_\_\_\_

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This program takes files of variables, such as names and addresses, and inserts them into a Stylograph text file for automated mail list generation. It will also allow a number of Stylograph text files to be appended at printout time so that page numbers and headings will be continuous in the printout.

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How does it work? Simple. We've compiled Pascal into the compact native code that is most common to professional applications. OmegaSoft Pascal is designed to integrate easily with existing software development tools available on most 6809 operating systems.

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Our compact single-pass compiler quickly translates Pascal into 6809 assembly language code. This means less time-wasting disk swapping and fewer multiple passes, with greater success rates. OmegaSoft Pascal is based on the proposed ISO standard with compatible extensions designed to make Pascal an important tool in industry and business. Byte wide variables allow convenient access to I/O devices. Custom I/O devices can be used in place of normal Pascal INPUT and OUTPUT files.

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Our symbolic debugger interfaces with the assembly language output of the compiler for fast, accurate program execution. Debugger commands allow other exciting possibilities:

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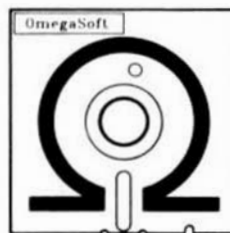
- Compatible with MDOS™ and XDOS™, FLEX™, DOS69™, and OS-9™
- Entry, External, and Absolute attributes for variables and procedures.
- Optimized in-line code generated wherever possible rather than subroutine calls.
- Compiler generates 6809 assembly language – can either be used with the debugger or assembled and linked to form a loadable object module.

- Standard data types plus long integer, hex, dynamic length string, and device.
- Expanded operations for pointers and characters allows low level code to be written in Pascal.
- Extensive type conversion functions.
- Compiler – Requires 48K system.
- Symbolic Debugger to run on any of the operating systems.
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- Manuals – detailed language reference handbook and a configuration manual.
- Runtime library and source.

Domestic Price: \$425. International prices separately quoted.

System additions include OmegaSoft's Relocatable Assembler and Linker, which is Motorola compatible and uses standard relocatable object format to support 14 directives and 10 commands. Domestic single-unit list price is \$125. OmegaSoft's Text Editor, with 16 editor commands, is line number and content oriented, with a Domestic single-unit list price of \$75. OmegaSoft's Arithmetic Processor option is used with the Pascal compiler and will use the AMD9511 chip for integer, long integer, and real calculations. Domestic single-unit list price is \$90.

TM: MDOS, XDOS, Motorola trademarks; Flex, TSC trademark; DOS69, Smoke Signal Broadcasting trademark; OS-9 Microware trademark.



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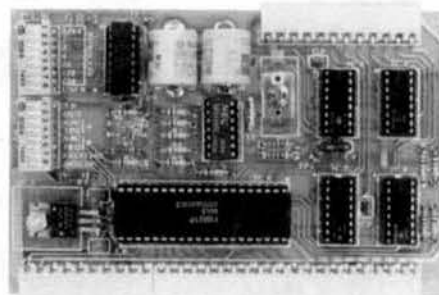


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# COLOR COMPUTER SYSTEMS SOFTWARE

## MODEM COMMUNICATIONS

Make your Color Computer an intelligent printing terminal with off-line storage! The Microtext module is just what you'll need for:

- Talking to a timeshare system or information service
- Printing out what is received as it is received
- Saving received text to cassette tape
- Re-displaying the received text even while on-line
- Communications with other computers
- Using your computer as a general-purpose 300-baud terminal
- Downloading programs from other computers

The Microtext module is a program pack containing not only firmware but a second serial port so that both your printer and modem can be connected at the same time. Microtext can be configured for any serial printer that will work with the Color Computer, even if it requires line feeds! But even if you don't have a printer, you can keep a permanent copy of your data by storing to cassette tape. Also, any Radio Shack/Centronics-compatible parallel printer may be used by adding the Micro Works' P180C parallel interface.

For those of you with special terminal applications, Microtext has selectable parity: it sends odd, even, mark or space. With mark parity (which is default) you can send to computers requiring either seven or eight bits. All 128 ASCII codes can be sent. Exchange programs with other Color Computer users! Basic programs may be downloaded from other computers or timesharing systems.

You'll find many uses for this versatile module! Available in ROMPACK, ready-to-use, for \$59.95.

## EDITOR/ASSEMBLER

The Micro Works Software Development System (SDS80C) is a complete 6809 editor, assembler and monitor package contained in one Color Computer program pack! Vastly superior to RAM-based assemblers/editors, the SDS80C is non-volatile, meaning that if your application program bombs, it can't destroy your editor/assembler. Plus it leaves almost all of 16K or 32K RAM free for **your** program. Since all three programs, editor, assembler and monitor are co-resident, we eliminate tedious program loading when going back and forth from editing to assembly and debugging!

The powerful screen-oriented Editor features finds, changes, moves, copies and much more. All keys have convenient auto repeat (typematic), and since no line numbers are required, the full width of the screen may be used to generate well commented code.

The Assembler features all of the following: complete 6809 instruction set; complete 6800 set supported for cross-assembly; conditional assembly; local labels; assembly to cassette tape or to memory; listing to screen or printer; and mnemonic error codes instead of numbers.

The versatile ABUG monitor is a compact version of CBUG, tailored for debugging programs generated by the Assembler and Editor. It features examine/change of memory or registers, cassette load and save, breakpoints and more. SDS80C Price: \$89.95

## MACHINE LANGUAGE

**MONITOR TAPE:** A cassette tape which allows you to directly access memory, I/O and registers with a four tied hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud. Including host system download/upload. 19 commands in all. Relocatable and reentrant. CBUG Tape Price: \$29.95

**MONITOR ROM:** The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to re-load the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pak I. CBUG ROM Price: \$39.95

**SOURCE GENERATOR:** This package is a disassembler which runs on the color computer and generates your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. 80C Disassembler Price: \$49.95

## LEARN 6809I

**6809 ASSEMBLY LANGUAGE PROGRAMMING**, by Lance Leventhal, contains the most comprehensive reference material available for programming your Color Computer. Price: \$16.95

# HARDWARE

## PARALLEL I/O

**USE A PARALLEL PRINTER** with your Color Computer! Adaptor box plugs into the serial port and allows use of Centronics/Radio Shack-compatible printers with parallel interface. Assembled and tested. P180C Price: \$69.95

**ROMLESS PAK I** — Is an empty program pack capable of holding two 2716 or 2732 EPROMs, allowing you up to 8K of program! The PC board inside comes with sockets installed, ready to go with the addition of your custom EPROMs. Price: \$24.95

**SPARE PARTS** — SAMS, 6809Es, RAMs, PIAs. Call for prices.

## 32K RAM!

**MEMORY UPGRADE KITS:** Consisting of 4116 200ns. integrated circuits, with instructions for installation. **4K-16K Kit Price: \$39.95. 16K-32K Kit (requires soldering experience) Price: \$39.95**

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## !!! FLEX\* and UNIFLEX\* Support !!!

**FULL SCREEN INVENTORY/REP (6800 I-BASIC) 6100-FLEX 6150-UNIFLEX**  
The full-screen inventory system provides a means of maintaining stock inventories. Using a linked, keyed random file structure based upon the item field, it keeps the file in alphabetical order for easier inquiry. With the FIND command, the user can locate and/or print all records matching on partial or complete item, description, vendor, or attributes. Items in backorder or below minimum stock levels may be located and/or printed thru the same process. Printed output may be produced in item or vendor order. A materials requirement planning (MRP) capability for manufacturing environments is included to allow the maintenance and analysis of hierarchical assemblies of items in the inventory file.

**TABULAR DATA SPREADSHEET (6800 I-BASIC) 6200-FLEX 6200-UNIFLEX**  
TABULAR DATA is similar to DESKTOP/PAGE (T. M. Desktop Computing) and provides for the generation and maintenance of tabular computation worksheets often used for analysis of business, sales, and economic scenarios. Its user interface provides these capabilities even to those users with little programming experience. Its extensive report-generation capabilities allow the user to generate professional results with minimum effort.

**TBC I-BASIC/XPC UTILITY PROGRAMS each group 625-FLEX 630-UNIFLEX**  
1. The TBC BASIC preprocessor is a TBC I-BASIC program which runs on the 6800 and has several capabilities beyond those of the TBC-supplied preprocessor. The primary ones are as follows:  
resequences all versions of TBC BASIC including precompiler,  
resequences some or all of a program,  
optionally resequences lines with blank sequence numbers,  
checks for missing label definition definitions,  
checks for new sequence number overflow,  
processes disk-to-disk rather than in memory.  
The TBC BASIC cross-reference program is an assembler program which runs on the 6800 and produces a cross-referenced listing of the variables and verbs contained in a TBC BASIC, TBC Y-BASIC, or TBC precompiler BASIC program.

2. The disk sort generator runs on the 6800 and produces a TBC Precompiler I-BASIC program from user-provided parameters. Depending upon the options specified, the generated program may perform any of the following functions:  
interactively accept sort specifications and sort files,  
sort a file as a callable subroutine,  
sort a file as a free-standing program,  
generate a test file and sort it to test sort algorithms.

Programs in source on disk - specify 5 1/4", sides, density.  
Detailed printed manuals are provided with all software.  
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**SUPER SLEUTH DISASSEMBLER 699-FLEX**  
SUPER SLEUTH is a set of programs which enables the user to examine and/or modify object program files on disk or in memory on 6800/1/4 systems. Programs may be disassembled into source code format and the source may be displayed, printed, or saved on disk. Labels produced by SLEUTH may be changed globally to labels of the user's preference. Cross-reference listings of labels in any Motorola assembler-formatted source file may be produced to aid in debugging or modifying the program. 6800/1/2/3/4/9 object code may be easily converted to 6800 position-independent code.

**I-80/6800/6805 SUPER SLEUTH DISASSEMBLER 699-FLEX**  
This version of SUPER SLEUTH analyzes I-80, 6800, and 6805 object programs. It is otherwise virtually identical to the other version of SUPER SLEUTH.

**MACRO CROSS-ASSEMBLER each 630 any 3 6100-FLEX**  
This set of macros for the TBC Macro Assembler provides the user with the capability of using a 6800/1/4 computer system for program development for 6800/1, 6805, 6502, 6800/3, and I-80 systems, using the assembler language format normally used on the target machine.

**6805 and 6502 DEBUGGING SIMULATORS each 675-FLEX**  
The Debugging Simulator enables the user to simulate, examine, and/or modify (i.e.) 6805 and 6502 programs on disk or in memory on 6800/1 systems. Programs may also be disassembled into source code format and the source may be displayed or printed.

**6502 TRANSLATOR SYSTEM 675-FLEX**  
The 6502 Translator is a set of 6804 programs which processes 6502 assembler programs and translates them into 6809 assembler code. The user has control over any of the decisions which must be made during the process. Those portions of the 6502 program which are known to be translated incorrectly are noted.

**FULL SCREEN FORMS DISPLAY (6800 I-BASIC) 650-FLEX 675-UNIFLEX**  
The DSE full screen display package supports any serial terminal with cursor control and memory-mapped video displays. The package substantially extends the screen input/output capabilities of I-BASIC programs by providing a simple, table-driven method of describing and using full screen displays. These table entries are easy to set up and maintain, and are normally stored on disk and read as required. A simple, interactive means of generating the forms and the data field definitions is provided.

**FULL SCREEN MAILING LIST (6800 I-BASIC) 6100-FLEX 6110-UNIFLEX**  
The full-screen mailing list system provides a means of maintaining simple mailing lists. Using a random file structure based upon the first character of the name field, it maintains the file in alphabetical order for easier inquiry. With the FIND command, the user may locate all records matching on partial or complete name, city, state, zip, or attributes. Printed listings and output to labels may also be produced on the same selective basis.

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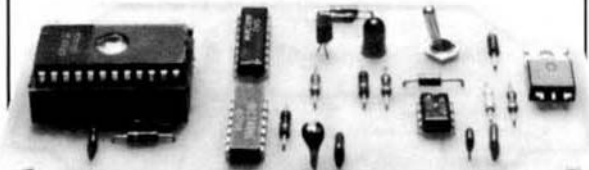
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[illegible]

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melting, and exit capability of up to 251 positions per line, SCORPIO III makes

change them at any time.

handler, automatically delete and then re-index the file.

you can merge multiple files with SCHEDATOR 111.

Even specify where to insert a file, what line to insert it on, and how many lines of the file to insert to start from, and how many lines of the file to delete.

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another file. You can save or copy the printed output of any file.

automatic line merging for custom mailings.

Automatic justification (left, center, right, or both) can be turned on or off at any time. Margins can be set at any time.

can be turned on about any job can be done in SCHEDATOR 111.

SCREDITOR III.

Initiated tabs may be set with **KEYWORD III**.  
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current display column, etc., etc.

SCREDDITION III is designed to provide office, personal, programming, or other ed formatting job that you might have. The applic

essentially unlimited.

The manual provides extremely detailed information on every mode, feature and function of SCREED III. It is written with office personnel and the uncomputerized user in mind. A unique feature of SCREED III is that it can be read in any order. The user can read more than any other such program on the market. The manual takes you, step-by-step, through every function of SCREED III, giving you practical examples and instructions with each step. No more reading for the sake of learning how to do it!

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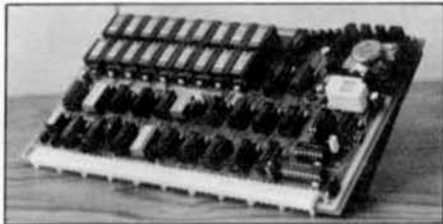
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Disk-3: CBUG09, SEC1, SEC2, FIND, TABLE2, INTEXT, DISK-EXP, \*DISKSAVE.

Disk-4: MAILING PROGRAM, \*FINDDAT, \*CHANGE, \*TESTDISK.

Disk-5: \*DISKFIX 1, \*DISKFIX 2, \*\*LETTER, \*\*LOVESIGN, \*\*BLACKJAK, \*\*BOWLING.

NOTE: All are as published or received by 68 Micro Journal, some have fixes and patches.

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Choice of 6802, 6808 or 6809 CPU  
(6802 and 6808 are software compatible with the 6800 or the opcode level).

DEVICE		6809 ADDRESS	6802-6808 ADDRESS
3 2716 Eproms	Eprom #3	F800-FFFF	F800-FFFF and E000-E7FF
	Eprom #2	F000-F7FF	F000-F7FF
	Eprom #1	E800-EFFF	E800-EFFF
1K Scratchpad RAM		E400-E7FF	A400-A7FF and A000-A3FF
MC6840 Triple Timer		E210-E217	8200-8207

MC14411 Baud Rate Generator producing baud rates of:

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High Range 440, 600, 1200, 2400, 4800, 19200, and 38400

The board does not contain a DAT and does not support extended addressing.

The board supports DMA by either HALT or BUSREQ when a 6809 CPU is used.

DMA to the devices on the CPU card is not supported.

The board will run any of the MKBUG™ compatible monitors in the 6802-6808 mode and SOUG-E, MUMBUG, and GMDUG-09 in the 6809 mode. The ELEKTRA CPU 8/9 will run any of the popular disk controller boards with the appropriate software. Special versions of OS-9™ L1 are available.

Base board: \$50.00\*      Kit: \$225.00\*      Assembled: \$275.00

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Fits the standard 30 pin SS-50 bus I/O slot

Can be configured for 4 addresses per port with the B port 2 addresses higher than the A port or for 16 addresses per port with the B port 4 addresses higher than the A port.

Each port is terminated at two 16 pin dip sockets, one socket configured for modem and the other socket configured for terminal or printer. RTS, CTS, DTR, DCD, DSR are appropriately implemented.

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Each port allows the interrupt request to be jumpered to the IRQ or RIRQ/NMI bus line.

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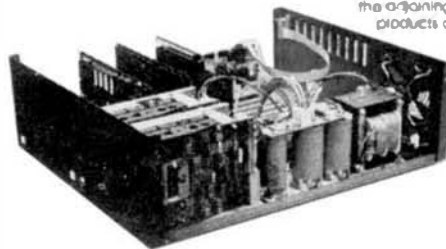
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The CPU, 56k memory board, and DMA controller board in the original picture are products of GIMIX, Inc.



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(2 years)

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Average cost for all four each month: \$6.53

(Based on advertised 1-year subscription price)

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68 Micro Journal  
 5900 Cassandra Smith Rd.  
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# SOFTWARE SYSTEMS AND SOLUTIONS FROM SD

Software Dynamics has been offering quality software for 68xx class machines since 1977. We recognize that our customer's needs grow, and design our software to provide a growth path. SD offers compatible single-user, multi-user, and (soon) network systems to meet this need. Programs that run on the single-user system run unmodified on the multi-user and network systems. A virtual terminal driver assures that screen-oriented applications run on any CRT.

The BASIC compiler is the result of 10 years experience in building BASIC interpreters and compilers. Sequential, random and indexed files are supported, along with true BCD numbers to eliminate conversion errors. Long variable names, blocks for structured programming, and true multi-parameter subroutines and string functions aid program construction and maintenance. Compiled programs are both small and very fast, and the source is completely protected.

SD also offers word processing and accounting software built to the same high standards as its system software.

## SDOS™

- Interrupt-driven DOS
- Read-ahead on sequential files
- LRU buffering optimizes random files
- Byte-addressable, device independent files
- Virtual terminal driver handles any CRT
- Command files
- Keyboard typeahead
- Disk file structure validation program
- Adaptable to any 68xx micro with 40kb or more
- Any combination of floppies or hard disk

## SDOS/MT™

- Multi-user version of SDOS
- 1 to 8 users
- User space to 60 kilobytes
- Any hardware mapping technology

## Structured Design BASIC V1.4

- 32 character variable names
- Line labels
- Parameterized, multi-line functions and subroutines
- Full access to SDOS sequential and random file facilities
- Multi-key indexed file option
- Print using with floating dollar sign
- 10 digit fast decimal floating point (no conversion errors!)
- Binary integer arithmetic
- IF-THEN-ELSE, WHILE-DO, ON ERROR DO
- Many other block structure facilities
- COMMON and program chaining
- Super fast execution
- Very compact compiled code
- Complete error trapping

SDOS is available for the following hardware:

Midwest Scientific Instruments 6800  
Pace Technology 480  
WaveMate Series 2000  
Omnibyte 800, 890  
Brittania Computing Models 242, 363, 484, 1010  
Motorola Exorcisor™

BASIC 1.3, ASM and EDIT are available for 6800 FLEX™, SSB DOS or MDOS™.  
SD also offers both 5¼" and 8" Winchester disk drives for Exorcisor systems.

Write for free catalog.

## SEEDIT

- What-you-see-is-what-you-get editor
- Uses cursor and arrow keys for positioning
- Insert by typing at cursor location
- Delete by RUBOUT at cursor location
- Edit any size file
- Cut and paste to move text
- Automatic margin wrap
- Tabs
- Very easy to learn

## TYPE

- Word or document processing
- Letter and envelope generation
- Form letters with mailing lists
- Complete margin justification
- Centering and underscoring
- Table of contents generation

## COUNT/UP

- Full accounting package
- General Ledger, Accounts Receivable, Accounts Payable
- User specifies all report formats
- Account structure and formats changeable at any time

## Other programs:

SORT	Sorts records according to any combination of key fields
EDIT	Powerful context editor
IDB	ROMable debugger with single step capabilities
MEMTEST	Thorough memory diagnostic
ASM	6800/6809 assemblers
CHESS	For lighter moments

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SOFTWARE DYNAMICS

2111 W. Crescent, Suite G ▲ Anaheim, CA 92801 ▲ (714) 635-4760

# 64K SS-50 STATIC RAM

**\$299<sup>00</sup>**

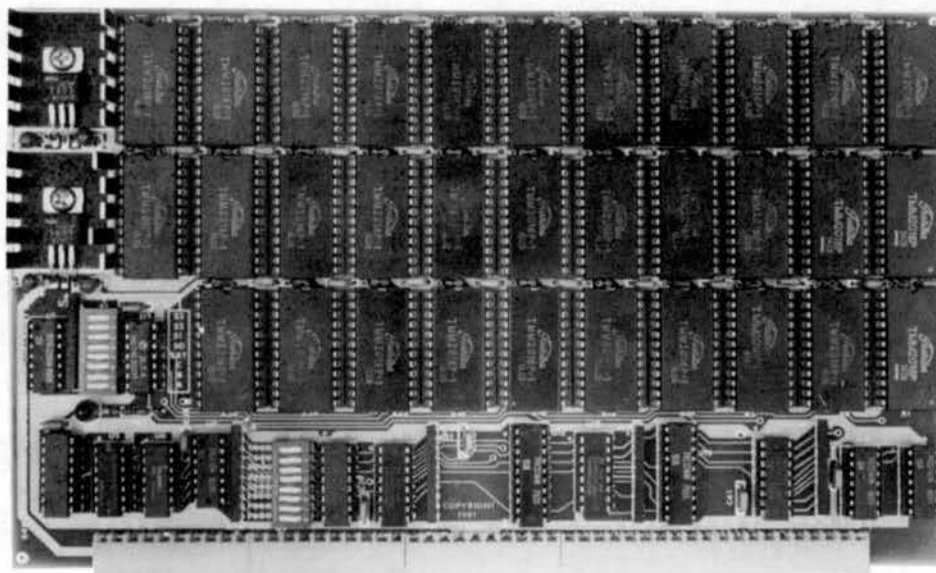
(48K KIT)

**NEW!**

**NEW!**

**LOW  
POWER!**

**RAM  
OR  
EPROM!**



**BLANK PC BOARD  
WITH DOCUMENTATION  
\$52**

**SUPPORT ICs + CAPS - \$18.00  
FULL SOCKET SET - \$15.00**

**ASSEMBLED AND TESTED ADD \$40**

## FEATURES:

- ★ Uses new 2K x 8 (TMM 2016 or HM 6116) RAMs.
- ★ Fully supports Extended Addressing.
- ★ 64K draws only approximately 500 MA.
- ★ 200 NS RAMs are standard. (TOSHIBA makes TMM 2016s as fast as 100 NS. FOR YOUR HIGH SPEED APPLICATIONS.)
- ★ Board is configured as 3-16K blocks and 8-2K blocks (within any 64K block) for maximum flexibility.
- ★ 2716 EPROMs may be installed anywhere on Board.
- ★ Top 16K may be disabled in 2K blocks to avoid any I/O conflicts.
- ★ One Board supports both RAM and EPROM.
- ★ RAM supports 2MHZ operation at no extra charge!
- ★ Board may be partially populated in 16K increments.

<b>56K Kit</b>	<b>\$349</b>
<b>64K Kit</b>	<b>\$395</b>

## 16K STATIC RAMS?

The new 2K x 8, 24 PIN, static RAMs are the next generation of high density, high speed, low power, RAMs. Pioneered by such companies as HITACHI and TOSHIBA, and soon to be second sourced by most major U.S. manufacturers, these ultra low power parts, feature 2716 compatible pin out. Thus fully interchangeable ROM/RAM boards are at last a reality, and you get BLINDING speed and LOW power thrown in for virtually nothing.

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6800 FLEX 2 version on 5" disk \$150, on 8" disk \$165  
6809 FLEX 9 version on 5" disk \$190, on 8" disk \$205  
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Prices include Airmail postage ANYWHERE in the WORLD!  
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LUCIDATA Ltd., P.O. Box 128  
Cambridge, CU2 5EZ, ENGLAND  
Telephone Orders (0223) 841906

Purveyors of Pascal since 1979

LUCIDATA Pascal is also available for Heath HDOS from  
POLYBYTES, 325 19th Street SE., Cedar Rapids, IA 52403  
& Smoke Signal Broadcasting DOS680 from WINDBUSH Micro  
Designs, Gaymers Way, North Walsham, NR28 0AN, ENGLAND

## 6809 C Compiler

VERSION 2.0

- Generates assembly language source output
- Requires only 20K memory
- Extensive library functions in source code
- Generates position independent code
- Supports most C functions
- Generates ROMmable code
- Floating point

Specify diskette size SS8, FLEX, or OS-9

VERSION 2.0 Price \$120.00

The C Programming Language—Kernighan & Ritchie  
Price \$16.00

TERMS: Check, MC/Visa, California residents add 6%.  
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**ASSEMBLED, TESTED AND BURNED-IN \$495.00**

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- 5 MB 5 1/4" Winchester Disk Drive and Controller
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# ANOTHER "BIG MOTHER"

Now we have a board with even more features than the original "BIG MOTHER". Our new one, the BMB-2, is the same size (9 x 18 x 1/8) as the BMB-1, but we've put in a lot more goodies. It's fully S50 or S50C compatible.

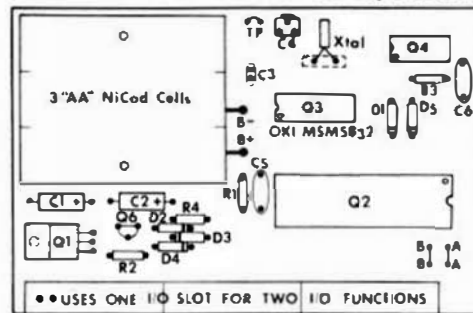
It has: 11 main slots, 8 I/O slots (one inch spacing), full decoding (including extended address decoding) (addressable at any 32, 64, or 128 byte boundary), uses only 32, 64, or 128 bytes with no overlap, has baud rate generator with 2 fixed + 2 user definable rates which can be individually assigned five to each I/O slot, hi range select multiplies all baud rates by four, I/O slowdown circuit that can be used to stretch E when slow I/O is addressed, optional bus pullups, and double labeling on board for S50 and S50C conventions.

Addressing, baud rates, and other options are assigned with hex MINIJUMP programming plugs, or wire jumpers may be used.

BMB-2 bare board and doc (May price) \$70.00

Add \$3.00 s/h. Ohio residents add 5 percent tax.

## Model 6800CL4 CalClock/TIMER



## IT'S A HARDWARE CALENDAR/CLOCK

- Keeps date and time without servicing by the computer
- Day-of-week, month/day/year, hour/minute (12/24hr. + auto Leap Year)
- Hands off setting/control/access of ALL functions via software
- On-card battery and charging circuit keeps time for months, power off

## WITH AN INTERVAL TIMER INCLUDED

- For ITSC/Flex2 compatible printer spooling, multi-tasking, etc.

Fully assembled & tested*	\$99.95	5" Disk (Flex2 □ Flex9 □)	\$10.00
Complete kit*	\$69.95	Goldplated buss connectors	\$6.00
Bare board*	\$35.00	Shipping & handling	\$3.00

\* FULLY DOCUMENTED: instructions; diagrams; theory; more than 20 pages of sample software (automatically puts date in Flex2 9 date buffer, adds time-of-day to assembly listings, maintains constant current time+date display on top line of CRT). Batteries not included. All IC's socketed.

□ FLEX is the registered trademark of Technical Systems Consultants, Inc.



**COMPUWARE** Corporation  
 P.O. Box 2710  
 Cherry Hill, NJ 08003  
 609-428-2309

New Jersey buyers: ADD 5%  
 terms: CASH; MC; or Visa  
 Flex9 □ Flex2 □ (default) □

## SOFTWARE FOR THE HARDCORE

### \*\* TOOLS FOR PROBLEM SOLVERS \*\*

- oo FIRST -- You have a problem -- OH NO!
- oo SECOND -- Of course! Use a computer!
- oo THIRD -- Choose the best hardware -- a 6809!
- oo FORTH -- Choose the most useful software.

### ----> FORTH - A TOOL FOR CRAFTSMEN!

----> Join the thousands of problem solvers who have discovered the FORTH method of producing results, instead of impediments.

↑FORTH is a refined version of FORTH Interest Group standard FORTH for 6809 (and 6800); 30% faster than FIG-FORTH, several times faster than BASIC.

FORTH is unique among computer languages in many respects, not the least of which is that it was created by problem solvers to help them on with their tasks, rather than by computer scientists.

FORTH applications have spanned a wide range of tasks -- listening to galaxies, talking with dolphins, running robots, controlling production line machinery, and sophisticated graphics systems.

Users of FORTH report productivity gains of 2 to 10 over other development tools. firmFORTH(tm) is for the programmer who needs to squeeze the most into roms.

firmFORTH and firmFORTH are trademarks of Talbot Microsystems.

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## ↑FORTH™ THE PROFESSIONAL'S CHOICE from the author of 6809 fig-FORTH TALBOT MICROSYSTEMS

### ----> ↑FORTH SYSTEMS <----

For all FLEX systems: GIMIX, SYMP, S50, or EXORCISOR; or convert to other systems. Specify 5 or 8 inch diskette, hardware type, and 6800 or 6809. For standalone versions, write.

Manuals available separately - price in (\$). Add \$5/system for shipping, \$12 for foreign air.

\*\* ↑FORTH - extended fig FORTH (1 disk) \$100 (\$15) with fig line editor.

\*\* ↑FORTH+ - extended more! (3 5" or 2 8" disks) \$250 (\$25) includes 2nd screen editor, assembler, extended data types utility vocabularies, GOING FORTH CAl course on FORTH, games, and debugging aids.

\*\* TRS-80 COLORFORTH - available from The Micro Works

### ----> APPLICATIONS PROGRAMS <----

\*\* firmFORTH - 6809 only. \$350 (\$10) For target compilations to runnable code. Automatically deletes unused code and unneeded dictionary information. Includes full source code for target compiler and essential FORTH nucleus. Requires but does not include ↑FORTH+.

\*\* TINY PASCAL compiler in FORTH. 6800/09 \$75 (\$20)

\*\* FORTH PROGRAMMING AIDS - elaborate decompiling and program analysis tools \$150 (\$10).

\*\* Also available: code for floating point, timers, and real time programming.

**TALBOT MICROSYSTEMS 1927 Curtis Ave., Redondo Beach, CA 90278 (213) 376 9941**



## SMOOTH™ Software

### SUPER MODEM PROGRAM

Transmit manually to distant computer

Transmit disk files (text) of any length to distant computer

Receive and save disk files (text) of any length on local disk system. If sending computer does not support an X-on/X-off protocol, then the received files are limited in size by the computer memory.

Tested to transmit and receive text at speeds up to 9600 baud. (CRT terminal must be capable of operating at a baud rate higher than the one the modem is operated at.) Half duplex option in case distant computer doesn't echo.

Echo option so user can simulate a time sharing system. (Super Modem Program doesn't support auto-answer but the source is provided for those individuals who wish to adapt our program to their special needs.)

Replaces CR with CR/LF (user option) for those using time sharing systems that don't transmit LF's.

Slow disk file transmit (user option) based on character verification for use on time sharing systems to which disk files cannot be sent at speed suggested by the baud rate.

Please specify 6800 SSB, 6800 FLEX™, or 6809 FLEX™, 5" or 8" Manual and disk with both source and object code ..... \$75.00

### STANDARD MODEM PROGRAM

Same as Super Modem Program above but without ECHO option, CR/LF for CROption, slow disk file transmit option, nor X-on/X-off option. Reception of disk files is limited to those small enough to completely fit within the receiving buffer.

Please specify 6800 SSB, 6800 FLEX™, or 6809 FLEX™, 5" or 8" Manual with instructions, source listing, and flow chart, disk with both source and object code ..... \$45.00

### ALL IN ONE

Editor - Text Processor - Mailing Labels

Mailing Lists - Use any CRT terminal and printer

Supports Editing commands such as bottom, change, delete, find, insert (single line), input (multiple lines), list, next, overlay (with cursor editing, character deletion and insertion), overstrike (for selected darker text), print, restart, set, top, underline, up, and verify.

Supports Text Processing commands such as block copy, block move, centering, margin justification (widen and narrow), paging, and tabbing.

Mailing Lists and Labels. Use the same mailing list disk file (with protected areas) for both mailing labels and repeat letters. Repeat letters are personally addressed to each person or selected persons on the mailing list.

Most Powerful File Handler found in any editor. Append one file to the end of another, or insert (merge) one file into another as designated by the line pointer. Print specified lines to your printer or to a disk file. Edit files larger than the text buffer. Does not produce output files when not desired. Delete disk files from line editor.

Prietary commands. Control characters can be sent to the printer for format control either directly from the control terminal or by imbedding them in the text. The set command contains interface initialization and character output routines to support the SWTPC Mp-C interface as well as the standard serial and parallel interfaces. Jumps are also provided. To user supplied printer routines. User selects the Port address (0 thru 7, A or B) thereby eliminating the need for the user to install printer software routines. Editor can be initialized for either 4 or 16 addresses per port.

Editor allows editing to either the monitor or DOS and then reenter (Warm Start) without destroying previously prepared text in the buffer. The Restart command erases contents in the buffer without the user having to reload the Editor.

The Editor allows the user to toggle between full duplex (no echo) and half duplex (echo) as needed. It responds to commands in both upper and lower case and can be used to create assembler source code and Basic programs as well as text.

Specify 6800 SSB, 6800 FLEX™, 6809 FLEX™, 5" or 8" ..... 50.00  
Printed source listing is available for an additional: ..... 35.00

### Software by Technical Systems Consultants, Inc.

Flex™ (includes Editor and Assembler)	150.00
UniFLEX™ (includes one year maintenance and update)	450.00
Editor	50.00
Assembler	50.00
6800 Cross Assembler on 6808	250.00
6809 Cross Assembler on 6800	100.00
Text Processor	75.00
Extended Basic	100.00
Basic Precompiler (specify standard or extended)	50.00
Pascal (Flex™)	200.00
Pascal (UniFLEX™) (Add \$75.00 for one year's maintenance and update)	225.00
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6809 Flex™ Utilities	75.00
6800 Flex™ Utilities	100.00
Debug Package	75.00
Diagnostic Package	75.00

### Software by Microware Systems Corp.

	UPDATE	SOURCE	MANUAL	OBJECT
OS-9™ Level One Operating System	75.00	400.00	40.00	200.00
OS-9™ Level Two Operating System	75.00	N/A	40.00	500.00
BASIC09™	75.00	N/A	25.00	200.00
OS-9™ Macro Text Editor		300.00	15.00	125.00
OS-9™ Interactive Assembler		300.00	10.00	125.00
OS-9™ Interactive Debugger (Disk version)		100.00	10.00	50.00
CIS Cobol Compiler	250.00	N/A	80.00	900.00
Pascal Compiler	100.00	N/A	40.00	400.00

### SWTPC

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SWTBUG (6830 compatible, limited quantity)	19.95
SWTBUG (2716 compatible)	N/A
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MP-LA Parallel interface (dual port, limited quantity)	40.00 60.00
MP-L2 Parallel interface (dual port)	N/A 120.00
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MP-T Interrupt timer	N/A 92.00
MP-BM 8K 4544 Memory board (limited quantity of kits)	150.00 275.00
S32 Universal Static Memory Board	N/A 124.50
MP-09 6809 CPU board	N/A 295.00
69 Chassis, P.S., 6809 CPU, 8K, RAM, One Serial Port	N/A 799.00

Universal 68XX Bare Motherboard, 6800/6809, 4/16 addresses per port, 8 50 pin/8 30 pin slots, baud rate generator, 15 1/8" x 9 3/8" 60.00

F & D (bare) Motherboard I, 12 50 pin/8 30 pin slots, 4/8 (modifiable to 16) addresses per port, complete address decoding, 18" x 9" 55.00

Connectors (10 pin, Titanium-Tin plated 5 microns for near gold quality) 84ch 50

Male with square cross section pins each 75

Female

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### Special Software

4K 6809 HUMBUG	75.00
4K 6800 HUMBUG (RAM needed at \$4000 and \$D000)	65.00
2K 6800 HUMBUG (With cassette LOAD and PUNCH)	40.00
2K 6800 HUMBUG (Extra commands instead of cassette software)	40.00
Other HUMBUG versions including video versions are available	
Spell'n Fix by Peter Stark	89.29
Dynamic Disassembler	80.00
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Microtime 6800 Calendar and Clock Board (assembled and tested)

Bareboard, connector, and documentation only oia ova

(See review Feb. 1980 '68 Micro Journal)

Microtime II

Data Mart 16K EPROM bareboard (2708 chips)

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Epson MX-90 (Centronics compatible, parallel interface)

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(Personally Modules extra for above programmer)

Optimal Technology, Inc. 30 pin parallel I/O board for EP-2A-79

Software package for EP-2A-79 (Specify 6800 or 6809)

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Smeka Signal Broadcasting

Monitor on 2716 with manual (Specify Chetlain or SWTPC)

DCB-4A Double Density Controller Board for 5" and 8" with DOS

DOS690 DOS Update with Editor and Assembler (Specify 5" or 8")

LMB-1A Motherboard

SCB-69 6809 CPU Board

M-16 X 16K Static Memory Board

M-24 X 24K Static Memory Board

M-32 X 32K Static Memory Board

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2 MHz 6809 Plus CPU, time of day clock, battery backup, 1K NMOS RAM

CMOS RAM substitution

GIMIX D namic Address Translator

SWTPC compatible DAT

Missing cycle detect card

Disk Controllers (All have data separators and can be used with either single or double headed drives)

5" single density controller without 1771 chip

5" single density controller complete

5" and 8" single density controller complete

5" double density controller with variable precomp

DMA 5" AND 8" double density controller with variable precomp

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Ribbon cable for two 5 1/4" disk drives (short)

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64K Static RAM Board with 24K of RAM installed

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64K Static RAM Board with 48K of RAM installed

64K Static RAM Board with 56K of RAM installed

64K Static RAM Board with 64K of RAM installed

16 Socket EPROM/ROM/RAM Board

8K Promboard (2708)

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Single port 30 pin serial interface (Requires 1 cable set)

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Dual port 30 pin parallel interface (Requires 2 cable sets)

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Cable sets for above boards (specify board)

2MHz 6809 PLUS Computer System with 56K Memory\*

Above System with #58 Controller and Special Software Pkg \*

Above System with #68 Controller and Special Software Pkg \*

\*with CMOS RAM and Battery Backup

Mainframe (Chassis, P.S. Switches, Fan, Motherboard, Baud Rate Gen.)

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Within the Continental U.S. please add 3% (\$5.00 minimum)

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Heavy items must be prepaid and will be shipped Emery Air Freight Collect.

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### AAA Chicago Computer Center

120 Chesnut Lane, Wheeling, IL 60090

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Our apology: We are running 4 weeks behind answering our mail regarding technical questions. Please phone during consultation hours for technical help.

Prices and inventory are subject to change without advance notice.

This ad is our catalog.

## GRANITE COMPUTER SYSTEMS

### ANNOUNCES

#### GCS 6809 FILEMANAGER

To use with the JPC High Speed Cassette I/O

You have been using the great JPC high performance TC-3 + CFM/3 on your 6809 system - but now that you have converted to the 6809, you have not really been able to use it with the 6809.

Now You can with FILEMANAGER

FILEMANAGER has been developed over a more than two year period to provide all the file handling capabilities of CFM/3

Fast efficient 6809 position independent code with enhancements

Find data strings (up to 16 hex bytes or 32 ASCII characters)  
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Select an additional output device - codes, printer, etc  
Flexible use of FILEMANAGER as subroutines by other programs

Runs on any 6809 6809 system with minimal modification

Comprehensive Manual - Object program cassette or 2716-1 EPROM

Introductory Price - MC Cassette \$29.95  
2716-1 EPROM \$39.95

Third of a series of super programs for the 6809

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Our EPROMMER for 6809 to use with  
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Our TEXTWRITER to use with the TBC EDITOR  
a synergistic text editing and processing package

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\* PROGRAMMES AND VERIFIES 2508/2708, 2516/2716 (SINGLE AND TRI-VOLT TYPES) 2532, 2732, 2732A, 2544, 2764 AND THE 128K TMS2520 (16K x 8).

\* EXTENSIVE COMMANDS MENU PROVIDES THE FOLLOWING FACILITIES:  
MOVE BLOCKS OF DATA, READ PROM INTO BUFFER, PROGRAM PROM FROM BUFFER, VERIFY PROM AGAINST BUFFER, EXAMINE/CHANGE BUFFER, FORMATED DUMP OF BUFFER, FILL BUFFER WITH SPECIFIED BYTE, RETURN TO DOS OR MONITOR.

\* FULLY DOCUMENTED USER'S MANUAL PROVIDES STEP-BY-STEP ADAPTATION AND OPERATING INSTRUCTIONS.

\* SOFTWARE SOURCE FILE INCLUDED...ENABLES CUSTOMIZING.

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SPECIFY: CPU (6800/6809), DISK SIZE (5/8"), AND DOS (SSB/FLEX).  
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Price: \$75.00 Available: June 1, 1982 from:

Micro Technical Products, Inc.

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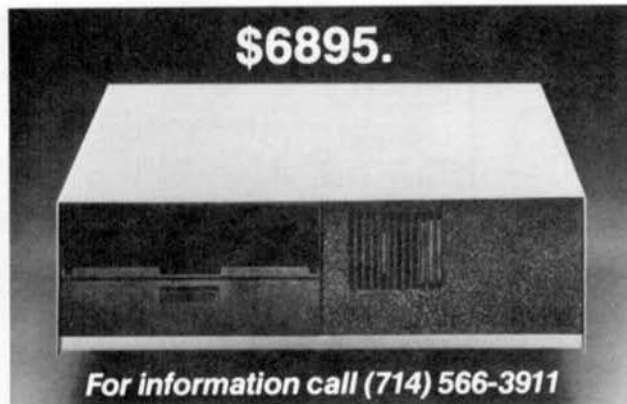
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## Color Computer SMALL C Compiler

- Generates assembly language source output
- Requires only 16K memory
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- Generates position independent code

Requires 16K, Disk System, Assembler  
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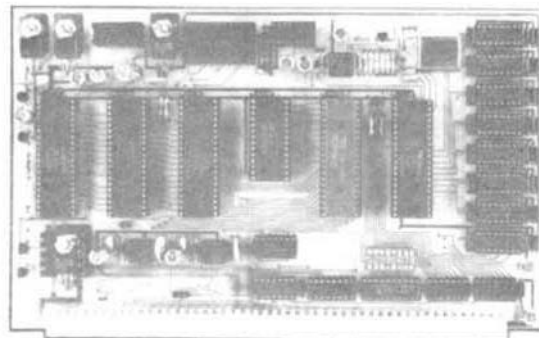
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Programming manuals for Video and Sound Processors  
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## ACCOUNTS PAYABLE

UniComp Accounts Payable is designed to enable complete control over a business' obligations. The program automatically ages invoices, and generates checks.

- Maintains a detailed vendor file.
- Generates comprehensive reports instantly to facilitate cash flow management.
- Completely menu driven requiring no special programming knowledge or experience.
- Interactive with UniComp General Ledger.

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## ACCOUNTS RECEIVABLE

UniComp Accounts Receivable is designed to enable complete control over a business' receivables. The program automatically ages accounts, and generates statements.

- Maintains a detailed vendor file.
- Generates comprehensive reports instantly to facilitate cash flow management.
- Is completely menu driven requiring no special programming knowledge or experience.
- Is interactive with UniComp General Ledger.

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## GENERAL LEDGER

The UniComp General Ledger package is a comprehensive program enabling a business to completely integrate and automate its accounting package.

- Designed to accommodate the entire ledger function and uses Generally Accepted Accounting Principles.
- Supports multiple companies/ profit centers on the same diskette.
- Provides an optional full restriction feature.
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## INVENTORY/ ORDER ENTRY

The UniComp Inventory/Order Entry software package is a comprehensive program designed for global resource management. Its purpose is to integrate and automate all aspects of inventory/ order entry processing.

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- Completely menu driven, with easy to read and understand instructions.

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UniBase is a stand alone data base management program enabling users to design their own data base program. It is menu driven with no programming knowledge or experience necessary to use it.

- Allows up to 10 key fields, user filled.
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- Allows restrictions on data access by terminal.

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## MAILING LIST

The UniComp Mailing List program is designed to enable a business to handle all aspects of mailing list processing.

- Enable the user to maintain accurate customer/client lists and update them at any time.
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UniComp Payroll is designed to completely automate all aspects of payroll processing.

- It generates payroll checks and stubs, internal reports, governmental reports, W2 and other reports.
- Enables the user to maintain extensive (70 fields) employee files.
- Completely interactive with the UniComp General Ledger package.
- Supports multiple companies/ subsidiaries on the same diskette.

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### Minimum Equipment Requirements Computer/Display

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## 6809 Small-C

More bang, less buck! WW Small-C 1.0,  
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for either TSC absolute assembler or SSB  
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For FLEX9 (with loader) \$52.50  
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RLOAD 3.0 separately \$17.50  
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Shipping included. Prices good until  
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## word's worth

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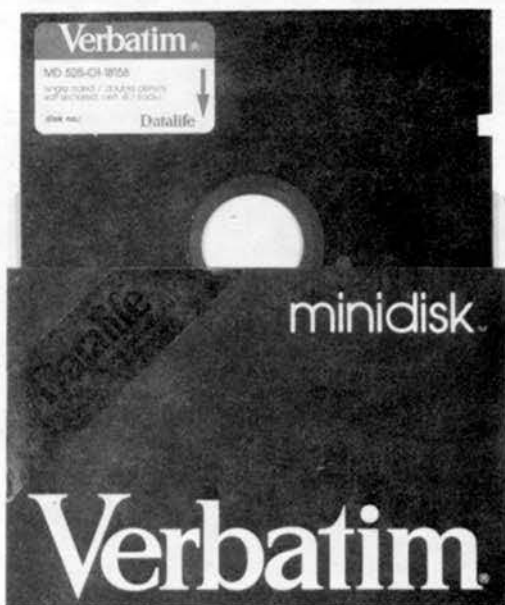
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Read SSB DOS68D or DOS69D Formatted Discs Directly While Running OS9. Three Utilities Eliminate Messy Serial File Transfers:

- SSBLIST - List Files on SSB Disc.
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Works with DCB4(A) Only

All Three Routines \$75

#### SCREEN EDITOR for OS9 or DOS69(D)

Finally, a Cursor Oriented Editor for OS9 or DOS69(D)

- Cursor Controlled Editing.
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6809

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#### DMS2/VM DATA MANAGER \*\$100.00

A complete Data Management System which permits files up to 1000K, precision BCD arithmetic, Multi-key access, selection and sorting. DMS2/VM employs a virtual memory access method under which programs "think" that entire files are in memory and directly accessible. The system supports alphanumeric, numeric, decimal, integer, coded and hexadecimal field types. Up to 14 fields and 12 levels per file may be defined by the user. A simple high-level command language allows a variety of data manipulation including reformatting, calculations, inquiry, key-merge, summation, print and display of database data. New version 2.0 reduces memory required to 32K and adds additional functionality and FLEXibility! Additional peripherals coming soon.

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All essential accounting and bookkeeping functions including journal, ledger, income statement and balance sheet. The user defines accounts, products and transactions to the system and thus tailors it to his own retail, wholesale or service environment. The system operates under DMS2/VM which permits custom reports of product movement or account status to be generated. Accounts receivable and payable are integral to the system as is point-of-sale capability. Many enhancements with new version 2.0 - including affordable pricing!

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Consists of a single "EPO" menu driven program which permits entry of purchase order information, verification and printing of the purchase order, scheduling of line items for shipment and printing of shipping invoices. Maintains order, back order and ship quantities and prints same on invoice. Operates under DMS2/VM Data Manager, above.

#### UTILITIES "A LA CARTE" - \$5.00 EACH

DUMP - Output any section of memory in hex and ASCII. DDSK - Output any disk sector in dump format. DMAP - Output track & sector chain of any file. PHAP - Output local map of command files. LISTD - Output all directory info on files. LISTDS - Output selected directory info in three columns. LISTF - List file with disk id & date heading. KILL - delete files without are you sure? prompt. FIND - Output all file records containing a given string. MCOPY - Copy files between disks using one drive. All load at \$100 and output may be directed to CRT, printer or disk. MINIMUM ORDER - \$25.00. All 10 for \$40.00.

All software is written in modular assembler and runs under FLEX O/S. Manuals available. DMS2/VM \$10., Accounting \$15., deduct from order. Add \$8N \$3.50. Foreign \$7.30. N.Y. State add 5% tax. Specify 5" or 8". Send Purchase Orders on letterhead or Check orders to:

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APPLIED IDEAS



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The Chieftain series includes 5¼- and 8-inch Winchesters that range from 4- to 60-megabyte capacity, and higher as technology advances. All hard disk Chieftains include 64-k memory with two serial ports and DOS6911 disk operating system.

## ● LIGHTNING ACCESS TIME

Average access time for 5¼-inch Winchesters is 70-msec, comparable to far more costly hard disk systems. That means data transfer *ten-times faster* than floppy disk systems.



## ● 2-MHZ OPERATION

All Chieftains operate at 2-MHz, regardless of disk storage type or operating system used. Compare this to other hard disk systems, no matter *how* much they cost!

## ● DMA DATA TRANSFER

DMA data transfer to-and-from tape and disk is provided for optimum speed. A special design technique eliminates the necessity of halting the processor to wait for data which normally transfers at a slower speed, determined by the rotational velocity of the disk.

## ● RUNS UNDER DOS OR OS-9

No matter which Chieftain you select . . . 5¼- or 8-inch floppy, or 5¼- or 8-inch

Winchester with tape or floppy back-up . . . they *all* run under DOS or OS-9 with *no need* to modify hardware or software.

## ● UNBOUNDED FLEXIBILITY

You'll probably never use it, but any Chieftain hard disk system can drive up to 20 other Winchesters, and four tape drives, with a single DMA interface board!

## ● SMOKE SIGNAL'S HERITAGE OF EXCELLENCE

This new-generation computer is accompanied by the same *Endurance-Certified* quality Dealers and end-users all over the world have come to expect from Smoke Signal. And support, software selection and extremely competitive pricing are very much a part of that enviable reputation.

## 20-Megabyte Tape Streamer Back-Up Option

Available with all Chieftain hard disk configurations. This cartridge tape capability provides full 20-megabyte disk back-up in less than five minutes with just one command, or copy command for individual file transfers. Transfers data tape-to-disk or disk-to-tape. Floppy back-up is also available in a variety of configurations.

## The Chieftain Computer Systems:

Here are the Chieftain 6809-based hard disk computers that are destined to change the data processing industry . . .

### ☐ CHIEFTAIN 95W4

4-megabyte, 5¼-inch Winchester with a 360-k floppy disk drive (pictured).

### ☐ CHIEFTAIN 95XW4

4-megabyte, 5¼-inch Winchester with a 750-k octo-density floppy disk drive.

### ☐ CHIEFTAIN 98W15

15-megabyte, 5¼-inch Winchester with a 1-megabyte 8-inch floppy disk drive.

### ☐ CHIEFTAIN 9W15T20

15-megabyte, 5¼-inch Winchester with a 20-megabyte tape streamer.



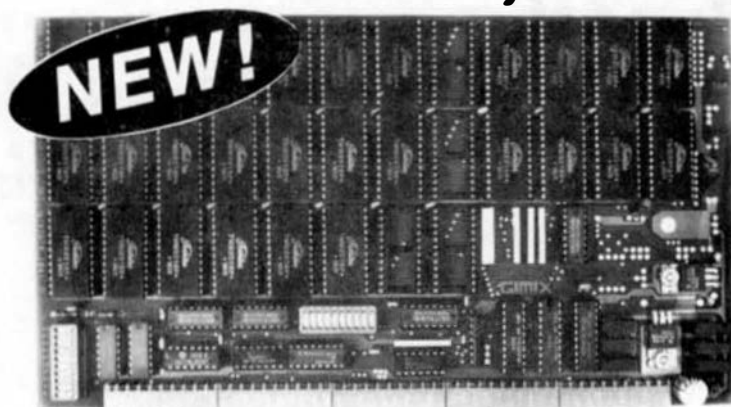
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# 64K BYTE STATIC RAM BOARD \$638.67

for 6800 and 6809 systems using the SS-50/SS-50C bus



also available:

56K . . . . .	\$578.57
48K . . . . .	\$518.47
32K . . . . .	\$398.37
24K . . . . .	\$348.27

All versions have gold bus connectors and are fully socketed, assembled, burned in, and tested. Versions with less than 64K can be expanded at any time by adding additional RAM chips.

## FEATURES:

- ★ ADDRESSABLE in two 32K sections with separate regular and extended address decoding for each section. Each section can be addressed to any 32K boundary in the address range (1M Byte with extended addressing). Each 32K section is divided into four 8K blocks that can be individually enabled or disabled. Disabled sections do not occupy address space.
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- ★ LOW POWER NMOS RAM requires less than 3/4 AMP (750 ma) typical at 8V, for a fully populated 64K board.

## Also Available:

## NON-VOLATILE 64K BYTE CMOS STATIC RAM BOARDS with BATTERY BACK-UP

*With all the versatility of the above boards -- PLUS!*

- ★ NON-VOLATILE MEMORY with built in battery back-up. Retains data even with system power removed. With the battery fully charged, data remains intact for a minimum of 21 days.
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64K.....\$798.64

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**GIMIX UNIVERSAL SYNCHRONOUS & ASYNCHRONOUS SERIAL I/O BOARDS.** This 30 pin board is available in three versions: with a 68B50 ACIA, a 68B52 SSDA (Synchronous Serial Data Adapter) or a 68B54 ADLC (Advanced Data-Link Controller). Control logic is provided for loop mode operation of the 68B54 ADLC. All three feature jumper selectable RS-232C or RS-423 (single-ended), or RS-422 (Differential) line drivers and receivers for the Receive data, transmit data, external clock, and handshake signals. External connections can be made through the 26 pin header at the top of the board or, when used with an optional GIMIX cable set, a 25 pin "D" type data connector. The jumper programmable I/O connector pinouts can be arranged to suit a variety of interface configurations.

68B50 ACIA (\$244.50)

68B52 SSDA (\$254.52)

68B54 ADLC (\$268.54)

### TO ORDER BY MAIL

SEND CHECK OR MONEY ORDER OR USE YOUR VISA OR MASTER CHARGE. Please allow 3 weeks for external orders to clear. U.S. orders add \$5 handling if order is under \$200.00. Foreign orders add \$10 handling if order is under \$200.00. Foreign orders over \$200.00 will be shipped via United Air Freight COLLECT, and we will charge no handling. All orders must be prepaid in U.S. funds. Please note that foreign checks have been taking about 8 weeks for collection so we would advise wiring money, or checks drawn on a bank account in the U.S. Our bank is the Continental Illinois National Bank of Chicago, account #73-370003. Visa or Master Charge also accepted. GIMIX INC. reserves the right to change pricing and product specifications at any time without further notice. GIMIX and GHOST are registered trademarks of GIMIX Inc. 1981 GIMIX Inc.

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# E X T R A FLEX & RS COLOR COMPUTER

With the EXATRON INTERFACE  
and DISK CONTROLLER

**GOOD NEWS #1** --- The popular, easy to use, and very powerful FLEX9™ Disk Operating System has been running on the Radio Shack Color Computer for several months using the Special EXATRON 32K Interface and Disk Controller. This System adds 32K Memory to a 16K Color Computer, providing 48K of RAM for User Programs, the FLEX™ Disk Operating System, etc. This is accomplished by adding 16K more Memory between the 16K in the Color Computer and the BASIC ROM's, and adding 16K of Memory ABOVE the BASIC ROM's (which is REQUIRED for the FLEX™ Disk Operating System).

**F-MATE(EX)™** --- This is a set of SPECIAL SOFTWARE ROUTINES supplied on a 5 1/4" Diskette which provides the Disk Driver, Keyboard, Input/Output, etc., routines required to marry the Special General FLEX™ Operating System to the Radio Shack COLOR COMPUTER. Procedures and routines are also supplied which allow the User to convert the Special General FLEX9™ Disk Operating System to a "bootable" System for normal use. The normal FLEX9™ Utilities such as COPY, CATALOG, LIST, RENAME, DELETE, etc. are included to provide a fully usable Disk Operating System.

**PATCHES** --- To patch and make functional various standard TSC Utilities and programs including APPEND, ASMB, EDIT, PUTLOR, SAVE, LOW, XBASIC, and others. A special NEWDISK (single side, single density, 35 tracks - which is what the EXATRON System will support) routine allows disks made on the COLOR COMPUTER to be read or written on other FLEX9™ Systems, insuring complete transfer of disks between Standard 550 Bus Computers.

**PROS and CONS** --- The F-MATE(EX)™ and EXATRON Expansion - Disk Controller allows the operation of the FLEX9™ DOS on the Radio Shack COLOR COMPUTER with NO HARDWARE MODIFICATION. It provides ALMOST 32K of Program Memory (less the Lower RAM area for variables and Screen Display). The BASIC ROM's are used for all I/O Routines, etc. It DOES NOT provide COMPLETE FLEX9™ Program Compatibility because most Programs must be relocated to make room for the normal variable area and Display Screen. The User DOES have the option of running either of the TWO Disk Operating Systems, FLEX9™ or EXATRON's.

## --- SYSTEM REQUIREMENTS ---

FLEX9™ Special General Version Including the Editor and Assembler (NOTE: the Editor and Assembler each sell for \$50.00, so you get FLEX9™ for \$50.00). \$150.00

Special EXATRON 32K Expansion/Disk Controller \$299.95

F-MATE(EX)™ FLEX9™ Conversion for EXATRON SYS.  
when purchased with Spec. FLEX9™ Sys. \$49.95  
when purchased without Spec. FLEX9™ Sys. \$59.95

Screen-Clean™ - R.F. Noise Eliminator for EXATRON SYSTEM  
wired and Tested \$39.95

Radio Shack 16K COLOR COMPUTER, with Extended BASIC and ready for the above items \$595.00

## --- DISK DRIVES and ACCESSORIES for BOTH SYSTEMS ---

Single Disk Drive in Enclosure with Power Supply;  
Single Sided, Double Density, 40 Track \$329.95

Dual Disk Drive in Enclosure with Power Supply;  
Single Sided, Double Density, 40 Tracks \$649.95

Single Drive Cable \$24.95  
Double Drive Cable \$34.95

With the RADIO SHACK COLOR COMPUTER  
DISK CONTROLLER

**GOOD NEWS #2** --- The popular, easy to use, and very powerful FLEX9™ Disk Operating System is NOW running on the Radio Shack COLOR COMPUTER with the Radio Shack COLOR COMPUTER DISK CONTROLLER. This system requires a Version 1.1 BASIC ROM and 64K RAM. This is easily accomplished on a normal Radio Shack 32K Color Computer, which already has the Version 1.1 ROM and memory bank select jumpers, by replacing the existing RAM Chips with KNOWN GOOD 64K Chips and enabling one NOR gate. If you do not have a 32K System, you can have it updated by a Radio Shack Service Center, or purchase a Version 1.1 ROM and modify it yourself. Data Comp can supply GUARANTEED 64K Memory Chips and instructions for the modification (see below).

**F-MATE(RS)™** --- This is a set of SPECIAL SOFTWARE ROUTINES supplied on TWO 5 1/4" Disks which provide the conversion routines for developing a normal "bootable" FLEX9™ System for operation WITH THE RADIO SHACK COLOR DISK CONTROLLER. One Disk is a Radio Shack formatted Disk which contains the routines which marry the FLEX9™ Disk Operating System to the specific requirements of the Radio Shack Color Computer, and the other Disk contains the Special General FLEX9™ Software. Routines developed for this conversion accomplish the normal Input/Output conversions, along with the necessary Software to activate the 64K Memory System, relocate the Display Screen Memory and variable areas, provide NEW, INDEPENDENT KEYBOARD and DISPLAY CAPABILITIES, etc.

**FEATURES** --- Data-Comp's F-MATE(RS)™ DOES NOT REQUIRE A "PATCHES" CONVERSION. This adaptation allows ALL FLEX9™ Compatible Software which uses the normal FLEX9™ I/O routines to run on the Radio Shack COLOR COMPUTER WITHOUT MODIFICATION. Special COLOR COMPUTER™ utilities supplied include:

1. FIVE different DISPLAY SCREENS (supplied with the Source Code so you can develop your own character set), 32 x 16 (the normal CC Screen), 32 x 24, 42 x 24, 51 x 24, and 64 x 24 Display Screens are available via a simple system command.
2. SAVE ROM's - a routine which allows saving the BASIC ROM's to a FLEX9™ Disk, so normal Radio Shack BASIC can be called and run with the 64K Memory still enabled.
3. DISK and MEMORY Diagnostic Routines.
4. EXTENDED KEYBOARD including full "CONTROL" Key functions, an "ESCAPE" Key, and user definable keys.
5. SPECIAL NEWDISK Routine for Formatting Single or Double Side, Single or Double DENSITY, 35, 40 or 80 TRACK Diskettes.
6. System capable of running up to THREE DOUBLE SIDED DRIVES, or FOUR DRIVES if none are Double Sided.

## --- SYSTEM REQUIREMENTS ---

FLEX9™ Special General Version w/ Editor and Assembler  
(see NOTE under EXATRON) \$150.00

F-MATE(RS)™ FLEX9™ Conversion for R. S. Disk System  
when purchased with Spec. FLEX9™ Sys. \$49.95  
when purchased without Spec. FLEX9™ \$59.95

Set of eight 64K RAM Chips w/ mod instructions \$149.95

64K RAM Radio Shack COLOR COMPUTER System \$749.95

Radio Shack DISK CONTROLLER and DISK DRIVE \$579.50

## ----- SPECIAL SYSTEM PACKAGE -----

64K Radio Shack COLOR COMPUTER, Radio Shack COLOR DISK CONTROLLER, Special General Version of FLEX9™, F-MATE(RS)™, and a Box of 10 Double Density Diskettes; a COMPLETE, ready to run SYSTEM on your Color TV Set \$1495.95

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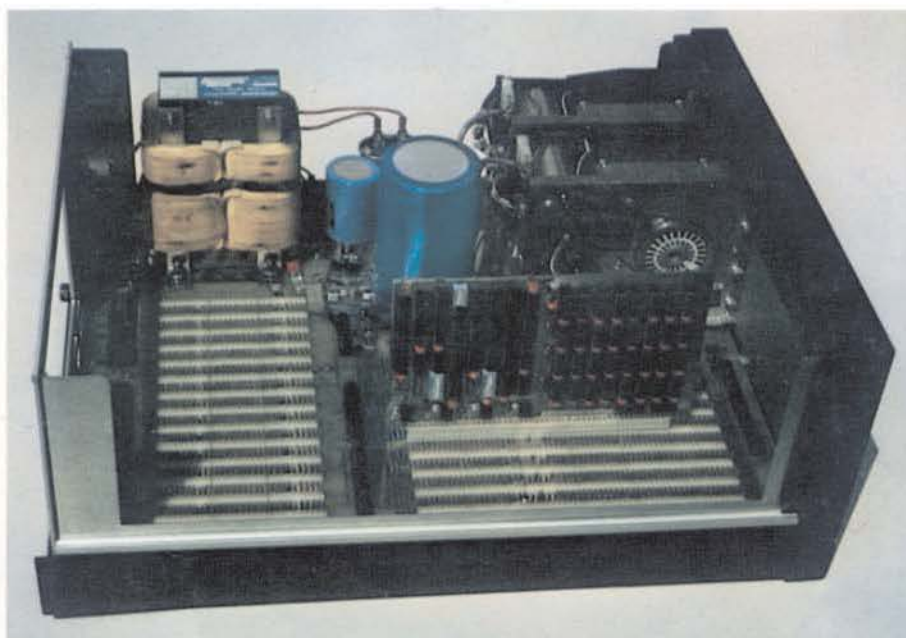
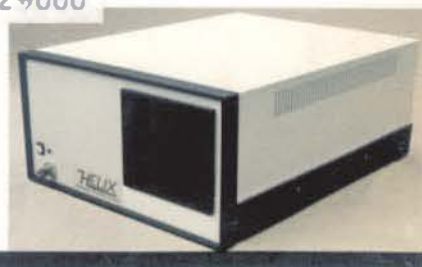
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# HELIX™



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### 6809

- Standard 2 MHz Operation
- Standard DAT Compatible with GIMIX and SWTPC
- Standard 6840 Interval Timer
- Standard 1K Scratchpad RAM
- Standard Clock/Calendar w/ Battery
- Provision for Programmers Console

### 68000

- Standard 8 MHz Operation
- Memory Management Hardware
- Provision for Programmers Console
- 16 Bit Power and 8 Bit Compatibility



The HELIX™ computer system represents the latest advance in S-50 bus computer systems. Relying on the physical nature of S-50 bus connectors to guarantee compatibility, the HELIX adds 14 bus lines (becoming S-64) to allow a 68000 processor to operate with full 16 bit data transfer and 24 bit addressing, while at the same time providing full interchangeability with existing S-50 components.

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- Ferro-resonant Transformer for Line Noise and Under-Voltage Protection
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- Conservative Component Rating for Reliability

## THE COMPONENTS

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- Only Top Grade Logic Circuits Used
- Industrial Grade Components Throughout

## THE MEMORIES

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- Tested at 2.5 MHz Operation

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- 16 Bit Power and 8 Bit Compatibility
- Runs in Existing S-50 Systems where Physical Space Allows
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- Fully Transparent Refresh

## THE PRICES

Because of the variety of configurations possible, full pricing cannot be given. Representative prices are:

- 64K 6809 HELIX ..... \$1995
- 64K 68000 HELIX ..... \$2595
- 512K 6809 HELIX ..... \$4450
- 512K 68000 HELIX ..... \$4995

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